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THE SURGICAL CLINICS
OF
NORTH AMERICA

Volume 10 Number 3

CLINIC OF DRS. EUGENE H. POOL AND ROLAND W. HIPSLEY

NEW YORK HOSPITAL

THE EFFECTS AND RESULTS OF SPLENECTOMY IN A VARIETY OF CONDITIONS

WE present these cases to demonstrate the effects and results of splenectomy in a variety of conditions. They include:

Thrombocytopenic purpura.

Malarial splenomegaly.

Splenic anemia.

Gaucher's disease

Von Jaksch's anemia.

Splenic anemia with yellowish-brown inclusion bodies in the spleen.

THROMBOCYTOPENIC PURPURA

This disease is still in the group of idiopathic purpuras. It occurs more frequently in the second and third decades of life and the patient complains of recurrent hemorrhage from the mouth, nose, and in girls frequent prolonged menstrual bleeding. The blood picture shows diminution of red blood cells, differing from other blood dyscrasias in a marked lowering of the blood platelets and no retraction of the clot in vitro. No substance has been isolated from the spleen to show that it is the cause of this blood picture, yet splenectomy has given good results in many of these cases, and is indicated after a fair trial of medical treatment.

Here is the case of a sixteen-year-old school girl who was perfectly normal except for acne vulgaris on her neck and face

of several months' duration. Three weeks prior to admission she complained of pain in her left loin and fever A cortical and large perinephritic abscess was found and drained. A culture of the pus evacuated showed Staphylococcus aureus She had a normal convalescence and was discharged with a granulating sinus The following day she developed a severe earache in the left ear and the next day an uncontrollable epistaxis with the appearance of petechiae on her legs and hands She was readmitted the third day after discharge There ensued a purulent left otitis media which developed into a mastoiditis two weeks later, accompanied by a severe anemia. The blood was carefully studied and is of extreme interest in view of subsequent events. The red cell count was 1,850,000 Hemoglobin 35 per cent Bleeding and coagulation time normal The platelet count was 320,000 There was no evidence of a primary blood dyscrasia at this time Blood cultures were negative.

Following a mastoidectomy and uneventful recovery the patient was well for two months, when she again had uncontrollable epistaxis and the appearance of petechiae on her body and extremities She reentered with a severe anemia of 2,260,000 and this time the blood platelets were constantly low, ranging from 28,000 to 56,000 on five counts, although the bleeding time was prolonged on only one occasion to sixteen minutes, by tests, from June 5 to July 8, she had severe recurrent epistaxis with vomiting of blood and passage of tarry stools Frequent generalized crops of petechiae and purpuric spots appeared Eight transfusions were given and twice the blood picture improved with resumption of bleeding after a period of eight days and three days respectively The hemoglobin ranged from 31 to 53 per cent and the red cells averaged 2,200,000 The coagulation time was normal. With low platelet counts and the anemia, the diagnosis was obviously thrombocytopenic purpura Thirty-three days after admission, a moderately enlarged spleen was removed. A transfusion was given before and during the operation. From the moment of removal of the spleen, no further bleeding occurred and the patient had a normal convalescence This girl was seen six months later and she was well and strong.

Blood platelets were again normal and the red cells around 4,000,000.

Case Report.—Patient, a school girl aged sixteen, German, entered the hospital on January 14, 1929 complaining of sharp pain in the left flank and fever. A perinephritic abscess was operated upon and drained. The culture showed Staphylococcus aureus. The postoperative course was uneventful. She was operated upon in February for an acute mastoiditis. At this time she had a severe anemia. The red blood cells were 1,850,000; hemoglobin 35 per cent, white blood cells 16,000, polymorphonuclears 65 per cent; bleeding time two and a half minutes; coagulation time seven minutes; platelets 320,000; blood culture negative. While in the hospital she developed petechiae on the legs and hands and had a severe nose bleed. A transfusion of 300 cc. of blood was given She reentered on June 5, 1929 with a history of uncontrollable epistaxis and ecchymotic areas which had appeared on the body within the preceding two weeks At the time of admission the patient's temperature ranged around 103 F. and the physical examination showed a markedly anemic individual with numerous petechiae and purpuric spots over the trunk and extremities The heart was moderately enlarged with a soft systolic murmur. The abdomen showed moderate distention, the spleen was not palpable. In the fundi were many large fresh hemorrhages.

Laboratory findings on admission: Red blood cells 2,260,000; hemoglobin 31 per cent; white blood cells 10,950; polymorphonuclears 47 per cent; platelets 56,000 Coagulation time was normal. Bleeding time moderately increased to sixteen minutes Blood smears showed evidences of a secondary anemia. She had several severe attacks of epistaxis which lasted for a period of hours and frequently a new crop of petechiae would appear on the trunk and extremities.

The patient was treated on the Medical Service for a period of thirty-two days. During this period she was given six transfusions with only temporary improvement on two occasions, eight and three days respectively. The bleeding then reappeared. The hemoglobin ranged from 31 to 53 per cent. The red cells averaged 2,200,000. The coagulation time was normal. The blood platelets on several counts were 56,000; 28,500; 28,000, and 118,000 On the afternoon of the thirty-third day she was given an 800-cc. transfusion and the spleen was removed during the evening by Dr. Seward Erdman, through a left rectus incision The spleen was about twice its usual size and it was easily removed. A transfusion was given simultaneously. Following the operation the bleeding stopped at once and for the remainder of the patient's stay in the hospital there was no evidence of either internal or external hemorrhage. The laboratory findings prior to discharge were: Red blood cells 4,000,000; platelets 205,000; bleeding and clotting time normal The patient was discharged with a normally healed wound on the eighteenth postoperative day She was seen January 11, 1930 (six months postoperative), when she looked and felt quite normal. The red count at this time was 4,200,000. Hemoglobin 60 per cent.

Pathologic report: The spleen was about twice normal size, felt soft, capsule was smooth On section the malpighian bodies were prominent and

white against a soft reddish background. Microscopically the malpighian bodies showed large germinal centers and the sinuses showed hyperplastic endothelium Some of the endothelial cells were enlarged and there was a very slight increase in connective tissue

MALARIAL SPLENOMEGALY

The occurrence of acute paroxyms of malaria following the removal of the spleen in chronic malaria has been recorded, yet the occurrence is of sufficient rarity to warrant report of such a case

In this connection it is of interest to observe that in Palestine there has developed a decided objection to splenectomy in malaria because it is felt that the spleen may be of importance in the production of an immunity to the infection and that splenectomy is therefore contraindicated in regions where reinfection is almost inevitable This impression, however, scarcely applies in nonmalarial districts and we feel that in such places the removal of a large annoying malarial spleen is justifiable. Yet such cases as the one here presented should be borne in mind, since the postoperative complication occasions anxiety unless its cause is immediately appreciated In our case several days elapsed before it was recognized that the chills and fever were due to malaria

Case Report.—Patient, aged twenty-four, Hebrew, entered the hospital December 29, 1923, with a complaint of swelling of the abdomen Three years before admission, while in Palestine, the patient contracted malaria as evidenced by history of chills and fever at intervals of ten to twelve days During the past two years, the patient had chills and fever at irregular intervals Last severe attack was one month before admission and at that time the patient noticed the swelling of the abdomen

Physical examination upon admission showed a fairly well-developed, well-nourished adult male, appearing chronically ill Lungs normal Heart not enlarged and with a soft, blowing systolic murmur. The abdomen was full and rounded and there was a palpable mass on the left side, the lower limit of which reached the level of the anterior-superior spine, extending across the midline of the abdomen and fusing above with liver dulness.

The laboratory findings were confusing Red blood cells 4,800,000, hemoglobin 70 per cent, white blood cells 6,600, polymorphonuclears cells 45 per cent, large mononuclears 3 per cent, transitionals 3 per cent, eosinophils 3 per cent No parasites were found in blood smears Wassermann was negative Echinococcus fixation test was positive

Patient was on the Medical Wards for seventeen days during which time he had a daily rise of temperature to between 100 and 101 F. He was transferred on the eighteenth day to the Surgical Service with a diagnosis of echinococcus cyst of the liver based on the positive fixation test and clinical course during this interval with a daily rise in temperature and negative blood smears

At operation an enormously enlarged spleen was found reaching well across the midline with marked adhesions to the diaphragm. The stomach and pancreas were in close apposition to the spleen The organ was removed through a right rectus incision and the wound counter-drained because of apparent injury to the tail of the pancreas Patient's condition was good following operation and the temperature became normal on the third postoperative day, and then began gradually rising until on the eighth day he had a severe chill and temperature rose to 104 4 F. This happened each day for the succeeding five Smears of blood taken during the chill showed many tertian malarial parasites White count was 16,000; polymorphonuclears 60 per cent Patient was given 5 grains of quinine, three times a day for three days, when chills and temperature subsided to normal on the fifteenth postoperative day. Patient was discharged on the twenty-third postoperative day with a normal temperature and a healed wound.

Pathologic report, on this spleen: Weight 2100 Gm. with a tense, smooth surface Cut surface was firm, dark bluish-red color with raised, translucent areas of a rather shaggy structure which proved to be follicles microscopically. The microscopical study was not conclusive and could only be summarized as a splenomegaly without anemia showing fibrosis, congestion, endothelial hyperplasia, and changes in the follicular structure. Sections were sent to the Board of Health Laboratory in the Canal Zone where the conclusion was reached that insofar as size of the spleen, lack of pigment and history, it was of the Colombian spleen type, but differed in its extreme congestion and prominent germinal centers

The last follow-up on this case was in February, 1924, when the patient came to the clinic and complained of having a mild chill on the previous day for the first time following operation. He felt much stronger and had had no pain He then left the city and has not been traced

SPLENIC ANEMIA

Splenic anemia may be defined as a disease of unknown etiology and chronic course, characterized by enlargement of the spleen which is often enormous and shows interstitial splenitis; secondary anemia which is often of moderate severity, marked tendency to hemorrhage from mucous membranes and into the skin and in the terminal stages cirrhosis of the liver with ascites.

When the diagnosis can be established, which is often difficult, operation offers a good expectation of cure, though it is attended with considerable immediate risk, due chiefly to the

fact that the spleen is often adherent to diaphragm and therefore difficult to remove

Case Report.—The patient, male, aged forty-one, entered the hospital, December 5, 1928 with a complaint of hemorrhages from the rectum. Present illness began ten years ago. While working in his store the patient was suddenly seized with cramplike abdominal pain, most severe in the upper abdomen and followed by tarry colored stools. Had three bowel movements during the day—all of the same color and of watery consistency. There was no nausea or vomiting, and the next day the stools were natural but the patient remained quite weak for several days. Similar attacks occurred approximately every two months since that time and this condition has become aggravated during the year previous to admission. He was informed during a medical examination four years previously, that there was some enlargement of his spleen which, however, was not visible to the patient until the last two months before admission. His last and most severe attack occurred one month ago when he was advised to have his spleen removed.

Physical examination showed a pallid, chronically ill, undernourished individual. Heart and lungs were normal and his abdomen was enlarged, with a smooth, firm mass occupying the left upper quadrant and extending to the level of the umbilicus and across the midline.

Laboratory findings: Red blood cells 3,300,000, hemoglobin 50 per cent, white blood cells 7,400, polymorphonuclears 73 per cent, lymphocytes 25 per cent, transitionals 2 per cent. Wassermann negative. Smear was of a secondary anemia type. Coagulation and bleeding time normal. Icterus index 5. Blood platelets 370,000. Fragility normal. Patient was given several transfusions and operated on his fifteenth day of admission. The spleen was removed through a T-shaped incision in the left upper abdomen. It was markedly enlarged, dark blue in color and smooth and glistening. The pedicle was remarkably wide and there were several vascular adhesions at the lower pole of the spleen, and the surrounding omentum. It was removed without difficulty. Temperature rose to 102.4 F. on the first postoperative day, and gradually subsided to normal on the fourteenth day. He was discharged on the twenty-ninth day with a granulating wound.—red count of 5,100,000, hemoglobin 76 per cent.

The pathologic report: grossly the spleen weighed 1090 Gm. and measured 8 × 14 × 23 cm. The cut surface was comparatively dry, fleshy in appearance, bluish-red and slightly irregular. Follicles were minute. The picture presented was one of a well-marked secondary anemia without any specially characteristic changes, and microscopical study of the spleen showed an interstitial splenitis with scattered areas of perisplenitis.

The patient was seen March 9, 1930, fourteen months after operation. He claims to be in good health and has had no hemorrhages.

Blood	Differential
White blood cells, 13,000	Polymorphonuclears, 36 per cent.
Red blood cells, 5,100,000	Lymphocytes, 64 per cent
Hemoglobin, 90 per cent	

Smear: Red and white cells have normal appearance. Platelets decreased

GAUCHER'S DISEASE

It is of interest to make a later report on the case of Gaucher's disease, which was originally presented in the Annals of Surgery, vol. 74, 1921, p 635. As then stated, the case was of interest first by reason of the very large size of the Gaucher's spleen. Second, unusual incision for its removal. Third, the advantage of ligating the pedicle before freeing the adhesions and deliver-

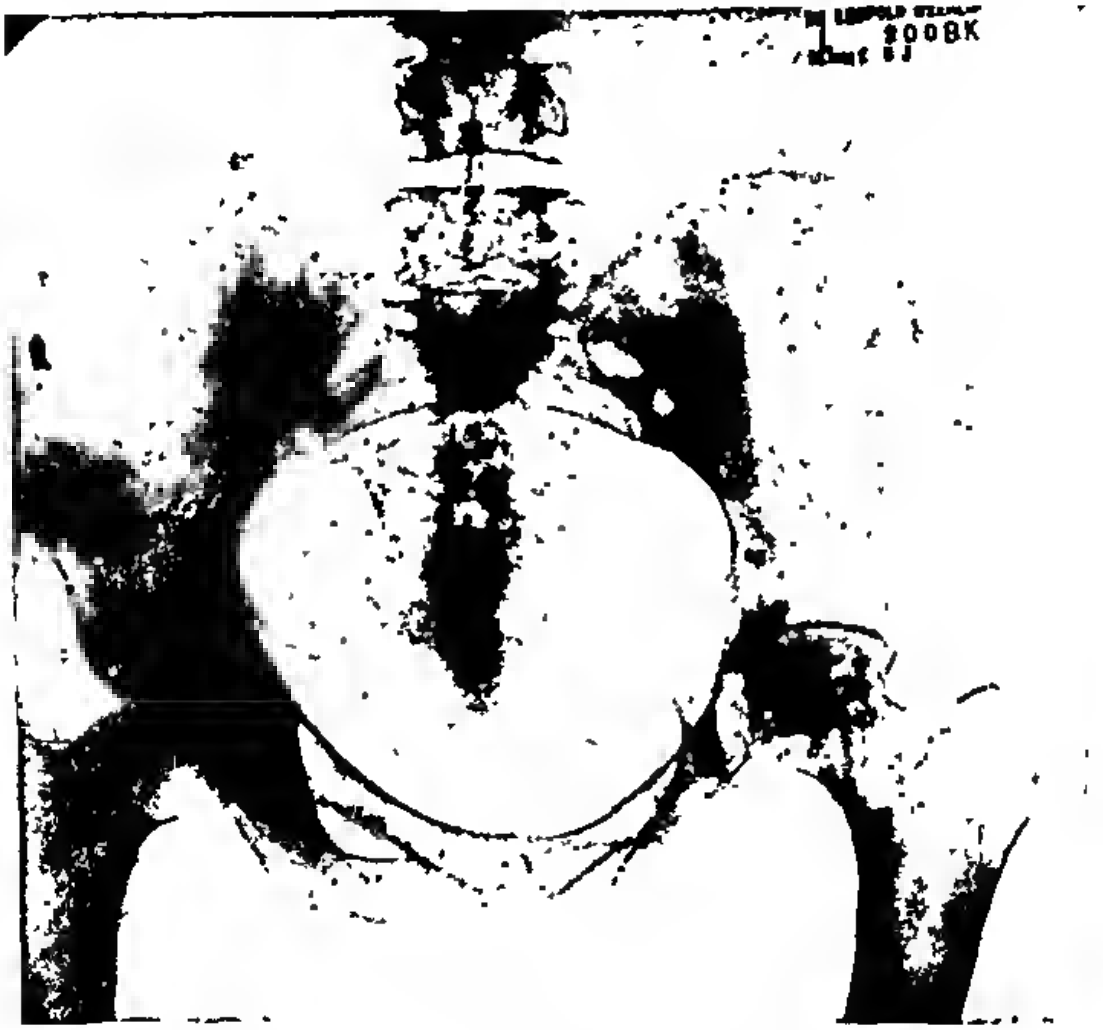

Fig 155A.—*x*-Ray of pelvis (Gaucher's splenomegaly) showing bone changes in upper end of left femur.

ing a large spleen. The operation was performed in January, 1921, when the woman was twenty-six years of age. Bone changes were noted some years later and her condition was reported in 1928. (See American Surgical Association, vol. 46, 1928, p. 121.)

At the present time, which is nine years since the operation, the patient's condition is excellent. She has had two children

and is now expecting the third The bone changes which have been followed for several years have progressed very little. It will seem therefore that undue weight may have been attached to bone changes in Gaucher's disease

As noted in Fig. 155A, the head of the left femur is mottled in appearance and there is a definite bone absorption in addition to some irregular calcification. The head is triangular in appearance The greater trochanter shows a definite decalcifying process and the medullary substance in the shaft of this femur shows mottling for about two thirds of the shaft

VON JAKSCH'S ANEMIA

This is not a specific clear-cut disease It is a condition occurring in children and marked by anemia, slight enlargement of the liver, and marked enlargement of the spleen and sometimes enlargement of the superficial lymph nodes The blood picture is characterized by a well-marked diminution in the number of red blood cells and hemoglobin and a persistent leukocytosis of varying degree The nature of the condition is obscure In von Jaksch's anemia there is no evidence that the spleen is pathologically active in blood destruction, yet splenectomy is indicated if the child shows no tendency to recover after a fair trial of medical treatment and transfusions

The operation is not dangerous Clinical improvement appears early, yet little is known concerning the late results For this reason we record the late results in this patient fifteen years after operation An earlier report with detailed history is presented in Annals of Surgery, 1916, vol 63, p. 122.

Case Report.—The patient was brought to the hospital, April 14, 1915, aged one and a half years, because of abnormal swelling of the abdomen which began when she was ten months old

Physical examination showed a well-developed and nourished child appearing chronically ill Abdomen large, slightly distended due to the spleen which extends to a point 16 cm below the ensiform in the midline and to a point 15 cm below costal margin in the left nipple line The edge is hard, firm, smooth, not tender The edge of the liver is felt 4 cm below the costal margin There are many dilated venules on the surface of the abdomen Red blood cells 2 700,000, hemoglobin 45 per cent, white blood cells 13,000, Wassermann negative

Splenectomy: There were marked postoperative erythroblastic crises

She has been followed carefully Development has been normal. When last seen, January 31, 1930, she appeared quite normal. The blood examination at that time was as follows:

Hemoglobin 80 per cent.

In the stained film, the red cells appear quite normal. The color index is slightly less than one, but they are fairly well stained and are normal in shape and quite uniform in size. There are no nucleated red cells present. The platelets are abundant and appear to be normal.

The white cells are moderately though definitely increased in number and show a diminution in the polymorphonuclears and an increase in the lymphocytes and large mononuclears. No abnormal forms are seen. A differential count shows:

	Per cent
Polymorphonuclear neutrophils	36
Lymphocytes	50
Large mononuclears	10
Eosinophils	2
Basophils	2
	100

It is of interest to note that some of our earlier cases of supposed von Jaksch's anemia have since been placed in a special group referred to by Hitzrot as "Unclassified Type of Splenomegaly in Children" and described by Cooley Witwer and Lee and others.

They present erythroblastosis after splenectomy, which is interpreted as due to bone marrow stimulation; peculiar monogoloid facies with thick cranium and prominent malar bones; icteroid tint due to chronic hemolysis; and notable bone changes. *x*-Ray of the skull shows marked thickening, with dense thin inner table and radial striations running to the surface. The long bones also show striae. The onset is as early as the second year with weakness, anemia, and lack of mental and physical development. There is dispute as to the late results of splenectomy, but Hitzrot has such a case followed for fourteen years with excellent results.

SPLENIC ANEMIA WITH YELLOWISH-BROWN NODULES IN THE SPLEEN

During the past few years considerable discussion has been aroused by the finding of yellowish-brown firm nodules in the

spleen. These were described in 1905 by Gandy and were thought by many to be a bizarre formation of connective tissue strands with deposits of salts. Nautt, Pinoy, and Grundy studying splenomegaly with anemia in Algiers, believed these bodies were caused by a fungus and they eventually cultured Aspergillus from the spleens Jaffee had similar results in this country. Other observers, however, still maintain the earlier belief. It has not been shown that the mycelium has an active part in the production of anemia The inclusion bodies have been described in different types of splenomegalies with and without anemia Generalized mycelium infections have caused anemia.

Our case showing the yellowish-brown nodules occurred in a young man aged twenty-eight, who has lived all his life in New York. He was perfectly normal until four and a half years ago. At that time he had a severe hematemesis and was admitted to a hospital for observation. He was hospitalized for five weeks. During this period he passed blood by rectum several times and was given three transfusions Nothing definite was found on physical examination He was forced to return to the hospital one month later on account of severe anemia At this time an enlarged spleen was found, he received a transfusion and felt well for the following four years. He noticed a gradual enlargement of his abdomen In June, 1929, he had another severe hematemesis and entered the hospital for a splenectomy. Repeated Wassermanns had been done during the four and a half years and the result was always negative A very large spleen was present and after a couple of transfusions it was removed The postoperative course was marked by a superficial wound infection which rapidly cleared up and an obstinate rise of temperature. He suddenly began having recurrent blood crises and became very anemic The pathologic study of the spleen showed the yellowish-brown inclusion bodies mentioned above. With the repeated blood crises and no evidences on physical examination of any causative agent, it was felt that there might be an active mycelium infection. Consequently, neosalvarsan which has given some favorable results in generalized mycotic infections was given. Thirty-six hours

after the first injection of 45/100 Gm. of neosalvarsan the temperature subsided to normal and the patient stated that he felt subjectively better. Six weekly injections of neosalvarsan were given. The blood crises stopped and the red count gradually rose from around 1,000,000 cells to 5,000,000 six months after operation. No attempts were made to obtain cultures of a fungus from this spleen. However, the reaction to the neoarsphenamine treatment was remarkable and especially so in the presence of repeated negative Wassermanns. This patient was seen six months postoperative. He is in excellent spirits and is asymptomatic with a normal blood picture.

Case Report.—Patient, aged twenty-eight, American, male. Admitted July 3, 1929 with a complaint of hemorrhages from the mouth and rectum with swelling of the abdomen and feet. Illness began four and a half years prior to present admission with a severe hematemesis. At that time he was hospitalized for five weeks During this period he passed blood by rectum several times and was given three transfusions. Repeated Wassermanns were negative Following discharge, he felt well, but was forced to return a month later on account of the anemia On this admission an enlarged spleen was found. Again the Wassermann was negative. He received a transfusion, and a splenectomy was advised. He felt well for the intervening period of four years except that he noticed a gradual enlargement of his abdomen. One month ago he had another severe hematemesis and entered the hospital for splenectomy. The past history was entirely negative, which in view of later findings is of some significance.

Physical examination on admission showed a pallid individual with a marked distention of the abdomen, and swelling of the scrotum and ankles The heart was moderately enlarged with a soft, systolic murmur. A marked venous hum was present over the jugular bulb. The abdomen was distended with moderate ascites The spleen was greatly enlarged, extending to the midline on the abdomen, and the lower boundary was on a line with the anterior-superior spine. It was smooth and firm with a rounded edge and easily palpable notch. Liver was moderately enlarged and of increased consistency.

The laboratory findings: Red blood cells 2,760,000, hemoglobin 45 per cent, white blood cells 3600 The smear was typical of a secondary anemia. Bleeding and clotting time normal The red cell fragility was slightly increased The patient was on the wards sixteen days before operation and during this time his temperature was normal. Ascites disappeared and he was given three transfusions. The red count was raised to an average of 4,000,000 red blood cells.

Splenectomy was performed on the sixteenth day by Dr. Paul A. Dineen, through a left rectus and flank incision. Transfusion was given before and after operation Spleen was found to be very large with many adhesions to the diaphragm. The liver was moderately enlarged and firm with a nodular

surface, presenting the picture of a cirrhosis The operation was difficult on account of the close apposition of the stomach and pancreas, and also because of the posterior adhesions. Some oozing which could not be controlled near the diaphragm necessitated leaving clamps and packing in the wound Patient had a moderately severe wound infection which gradually cleared up The temperature subsided with the infection and then began going up from 101 to 103 F daily Coincident with the rises in temperature the patient had repeated blood crises Physical examination showed no apparent reason for the temperature and there was no internal hemorrhage The red cells averaged from 1,000,000 to 2,000,000 Repeated transfusions did not control this condition

Pathologic study of the spleen at this time showed bizarre yellowish-brown bodies which in their formation resembled mycelium The possibility

Fig 155B —Section of spleen showing yellowish-brown inclusion bodies resembling mycelium threads

of an exacerbation of a mycelium infection was considered and a course of neosalvarsan seemed justified, in spite of the cirrhosis of the liver The patient was given an injection of 45/100 Gm of neosalvarsan and within thirty-six hours his temperature subsided and remained normal These injections were given once a week for six weeks There was no further rise in temperature and the red cell count done every second day showed a gradual increase from 1,500,000 to 3,500,000 on discharge

This patient was seen six months after operation and was quite well His red count was 5,000,000 and he had been asymptomatic since leaving the hospital The pathologic report on the spleen was similar to any splenic anemia except for the yellowish-brown inclusion bodies as shown in Fig. 155B

CLINIC OF DR. EDWIN BEER

Mt. Sinai Hospital

UROSELECTAN AS AN INTRAVENOUS PYELOGRAPH, URETEROGRAPH, AND CYSTOGRAPH MEDIUM (SWICK)

In a recent number of the Klinische Wochenschrift, Dr. M. Swick reported that he had been able to obtain through Professor Binz an intravenous, nontoxic iodine-containing preparation which can be injected intravenously and is excreted by the kidneys in sufficient concentration to produce distinct pictures of the kidney, pelvis, the ureters, and the bladder. In the same Journal, in combination with Von Lichtenberg, another paper on this subject was published concerning the foregoing striking facts. While a number of men during recent years have been interested, and have been attacking this problem, Dr. Swick would seem to be the first to solve it in a satisfactory manner This represents, to my mind, one of the most important contributions to general medicine and to urologic and general surgery that has been developed in recent years

The actual valuc of this new medium is difficult to estimate completely at this moment, but without indulging in any ecstatic prognostications of the widc value of Uroselectan, I believe that one is justified in concluding that, as an intravenous pyelographic medium, it is going to be a great boon to humanity. Although the field of usefulness for Uroselectan has been only superficially scratched in my clinic, from the cxperience in some dozen or morc cases, all selected for this type of pyelography and in which ordinary pyelographic methods could not be employed, I feel convinced that both the medical man and the surgeon are going to derive great aid from the use of this new drug

Both Swick and Von Lichtenberg vouch for its nontoxicity and its rapid disappearance from the blood They find that it intensifies the kidney shadows, and appears in the urine early and in sufficient concentration to produce excellent shadows under the x-ray both in the pelvis and ureter, as well as in the bladder Moreover, depending upon the renal function, the rapidity and duration of the excretion of the iodides varies, as both authors have reported, and as we have seen in the films taken in the cases in my clinic at this hospital. An estimate of the iodide output quantitatively and chronologically may supplement the roentgenographic functional test. Poor kidney function is evidenced by delayed, slow excretion, whereas good kidney function is evidenced by early appearance and early filling of the pelvis and ureter The usefulness of this new drug will be seen in a great variety of conditions. In the past, attempts to study the dynamics of the urinary tract were carried out by injecting opaque solutions through ureter catheters into the pelvis and ureters The very presence of a catheter in the ureter probably led to many inhibitory or stimulating effects and pyeloscopy and ureteroscopy, although having already taught us some new physiologic facts, may now be placed upon a much more satisfactory basis when the Uroselectan can be visualized under the fluoroscopical screen without inducing abnormal effects due to the presence of a foreign body

In the past, physicians have been satisfied in testing the kidneys to examine the urine, palpate the kidney regions, and occasionally make routine functional tests With Uroselectan periodical health controls of the kidney, ureter and bladder will be simplicity itself, and I feel confident from the pictures I have seen that many surgical organic conditions are going to be recognized in their early stages as a result of the regular use of Uroselectan In a study of 84 cases, Von Lichtenberg states that in 61, or 75 per cent, Uroselectan gave satisfactory diagnostic data. In 22 cases cystoscopy with pyelography was necessary As a result of a comparison of the two methods he believes he can conclude that absence of kidney shadow means, first, no kidney or, second, functionless kidney Such functionless kid-

neys may be present in extensive tumors, pyonephrosis and badly infected, obstructed kidneys. Apparently, also, there may be no adequate shadow in insufficiency of the heart muscle. In cases of peripheral obstruction such as in prostatics or strictures where the kidney function is very defective occasionally there may be bilateral absence of the shadow in the kidney region. On the other hand, excellent pictures are obtained in hydronephrosis, ureter stones, kidney stones and other mild obstructive conditions with fair or good renal function. In some of the cases that we have studied, the pyelogram from below has been of much more value than the intravenous pyelogram. It gave a much clearer outline and better filling. In some of the cases that Dr. Swick illustrated in his paper, referred to above, the pictures are very clear even in the absence of obstruction, though it must be admitted that the majority of his pictures are in atonic or obstructed organs, and only one or two in absolutely normal pelves and ureters. I can see outside of the routine picking up of pathologic conditions in the kidney and ureter, a great usefulness for Uroselectan in checking up on the kidneys in patients who are intolerant to repeated cystoscopic pyelograms.

Recently a patient was pyelographed from below for a large, left renal mass which in the pyelogram looked like a polycystic kidney The opposite ureter could not be entered owing to trauma An adequate picture of the second kidney to determine whether it was polycystic or not could not be obtained With intravenous pyelography, the second kidney was found to be normal in contour and its pelvis and calices totally different from those of the other side. We could conclude that we were dealing with either a unilateral polycystic kidney, which is a great rarity, or a tumor of the kidney. At operation a large, malignant tumor was found in the kidney which at first impressed us as having the picture of a polycystic kidney. Many cases of a similar character are seen by every urologist where for one reason or another one cannot make repeated examinations of a confirmatory character or where one cannot enter the ureter far enough or even see the ureteral orifice to get an adequate picture (Figs. 156, 157)

In one such case, repeated cystoscopies had been made and though it was known that the patient had renal tuberculosis there was always doubt as to whether the disease was bilateral The bladder was so deformed that ureter catheterization could not be made No indigo was seen entering the bladder and the

Fig 156—A W. Pyelogram from below suggested left polycystic kidney No pyelogram of the right kidney done Subsequent attempts to enter right ureter failed

bladder was markedly deformed The diagnosis of bilateral renal tuberculosis had been made years before, tubercle bacilli were present in the urine and the *x*-ray without injection did not clearly demonstrate the size of the kidneys Under intravenous pyelography, it was clearly demonstrated that one kidney was

functionless and excluded and that the other was an infected tuberculous pyonephrosis (Fig. 158). Again there are cases in which owing to the nature of the operation on the ureter, as in transplantation of the ureter following partial cystectomy, cystoscopically it is difficult to enter the newly implanted ureter

Fig 157.—A. W. Intravenous pyelogram. Right kidney distinctly different from left pelvis, being normal, not suggestive of polycystic. Left pelvis less clearly filled than from below. Diagnosis, therefore, unilateral, left polycystic kidney. Operation adenocarcinoma of left kidney.

so as to get an idea of the condition and functional activity of the transplanted kidney. In such cases Uroselectan will be of great advantage in studying the end-results of such transplantations. In one case, where Uroselectan was used some two years following

resection of the bladder and the transplantation of the ureter, the transplanted kidney was seen to visualize clearly, a mild hydro-ureteronephrosis was present, showing that the kidney was functioning and of use to the patient It has usually been said that these transplanted ureters fail to function properly and

Fig 158—M Bilateral renal tuberculosis Ureters cannot be catheterized Intravenous pyelography shows excluded left kidney, and right kidney tuberculosis involving the lower pole Right kidney had been explored some ten years previously, and found to be tubercular At this time there was a left renal pyuria In addition, there is tuberculosis of the spine.

that the kidney eventually undergoes atrophy. This whole question can be studied very beautifully with Uroselectan and I feel convinced from my own experience that such kidneys do not regularly undergo atrophy, but are of use to the host. Only

recently, six years after such a transplantation, I was forced to remove the transplanted kidney which had become acutely infected, and the kidney on removal showed, in addition to a pyelonephritis, a moderate dilatation of the kidney with a very

Fig 159.—E. Resection of bladder, carcinoma, with reimplantation of left ureter. Cystoscopy, left ureter orifice cannot be entered No indigo seen Intravenous pyelogram shows well-filled, functioning, moderately dilated left kidney and ureter, with deformity of the bladder in the cystogram, and clear pelvic outline of the right kidney, one hour and twenty-five minutes after Uroselectan injection.

well preserved parenchyma. From these observations it is evident that the recommendation to tie off such ureters and not transplant them into the bladder in a new site is surely based on fallacious reasoning (Figs 159, 160). Ureters that are trans-

planted into the bladder, following injury during pelvic operations, can also be used for a study of the functional value of such transplanted kidneys by this new method. Again, ureters transplanted into the rectum or sigmoid, as in the Coffey opera-

Fig 160—E Two hours and twenty-five minutes after injection, showing well developed calices in the transplanted kidney, and pelvis well filled, as well as ureter, down to the site in the pelvis, close to the position of implantation

tion can be studied most gratifyingly, both as to the functional activity and as to the pathologic deformation which develops months or years after such neostomies In one of the cases recently studied with Uroselectan, the two ureters having been transplanted in the sigmoid for exstrophy of the bladder some

months earlier, we were able to demonstrate that both kidneys were functioning well and both kidneys and ureters were moderatedly dilated Such cases could only be studied in this way because the implanted ureteral orifices in the sigmoid are absolutely inaccessible (Figs 161, 162).

Fig. 161.—P Bilateral ureter implantation in the sigmoid. Intravenous pyelogram outlines both ureters and kidneys, which are moderately dilated.

In addition to these various groups of cases in which Uroselectan will be of inestimable value, we are studying a series of cases in which plastic operations have been done on the pelvis for hydronephrosis, as well as cases in which ureter implantations into the pelvis have been made.

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CLINIC OF DR. HOWARD LILIENTHAL

MT. SINAI HOSPITAL AND NEW YORK INFIRMARY FOR WOMEN AND CHILDREN

I. LUNG ABSCESS AND EMPYEMA IN A CHILD SIX WEEKS OLD; II. CARBUNCLE OF THE LEFT KIDNEY: RESECTION OF THE UPPER THIRD OF THE KIDNEY; III. A CASE OF ABSCESS OF THE LEFT UPPER PULMONARY LOBE: THORACOTOMY AND DRAINAGE

I. LUNG ABSCESS AND EMPYEMA IN A CHILD SIX WEEKS OLD

Clinic at the Private Pavilion, Mt. Sinai Hospital—Let me introduce you to little Bertram R., who begins his surgical experiences at the early age of six weeks Dr. Leo Mishkin of New York referred him to me with the history that two weeks after his birth he had what was called a cold, with fever and with discharge from his right ear. Eight days later the otorrhea had ceased but bilateral bronchopneumonia developed and the child was very ill, the temperature running to 102 F. The right lung gradually cleared, but the left chest became flat on percussion and there was cough with profuse blood-stained sputum The attacks were very exhausting, sometimes continuing without relief for one half hour at a time. The temperature gradually diminished to between 99 and 101 F. The child nursed well.

Diagnostic aspiration today (not done by me) disclosed thick pus from the chest beneath the left scapula. The baby came to us here in the private pavilion where I saw him for the first time only about an hour ago. Although it was long after *x*-ray closing time, our resident roentgenologist made films of the chest and we had them for examination in about twenty minutes The first picture (Fig. 163) was made with the child recumbent. It reveals, as you see, an opacity of the entire left chest. Owing to the struggles of little Bertram this picture was taken in a slightly rotated posture so that it looks as if the mediastinum were displaced. I do not think that this was the case, however, as you will see in Fig 164, in which the patient was erect and in which a fluid level is visible My diagnosis is that this patient developed a lung abscess from his bronchopneumonia and that this perforated into the left pleural sac, producing an acute empyema. The right chest looks normal.

Considering this case one of emergency, we shall operate at once and, of course, in view of the great amount of foul expectoration which you can see blown out of the mouth at every spasm of coughing, a local anesthetic only can be used.

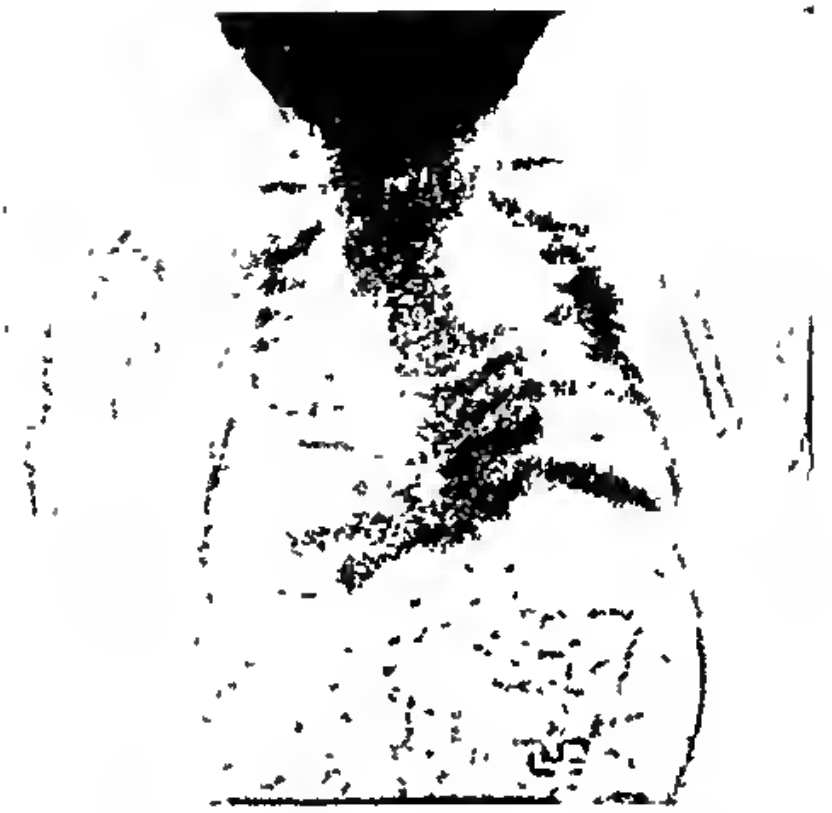

Fig 163 —Case 1 Recumbent roentgenogram before operation

Fig 164 —Case 1 Fluid level seen in erect posture

This patient is so tiny that it is difficult to place him on the table in a position which shall make it easy for me to work. Therefore, I will ask Miss Lillian Rice, our anesthetist, to descend from her professional level and act as an important assistant by holding the child in her arms and in the posture of lordosis, so as to spread the ribs from each other. I now apply a little piece of ice to the skin over the eighth interspace in the posterior axillary line At the end of two minutes the skin is sufficiently chilled so that the puncture of the hypodermic needle will not be felt. We are using the usual novocaine and adrenalin solution. Having benumbed the tissues, we will make a very minute incision, not more than ¼ inch long

Being all ready for operation, no harm can come from aspiration to make sure that we shall strike pus in the operative field. Ordinarily aspiration in a case like this through the healthy skin is not a safe procedure because of the danger of infecting the deep layers of the chest wall I maintain that puncture of the chest to find pus should not be undertaken unless we are prepared to follow up a positive finding at once, and also that when the puncture is over, whether positive or not, a few minims of pure alcohol should be injected as the needle is withdrawn in order to sterilize, if possible, the puncture tract.

Here, you see, we have found pus at once. The question now arises, how shall we approach this problem? With a connection between the bronchial tree and the pleural sac, which must be present here, valve drainage cannot be counted upon, but let us hope that the bronchial fistula is minute and that the size of the tube we shall use will be enough larger than this fistula to permit valve action to be effective.

I had hoped to employ a trocar and cannula here, and you see it has been laid out for me, but the space between the ribs is so small that this cannula would not pass and a smaller one would necessitate my using a tube with too fine a caliber for proper drainage. Judging by palpation, I cannot tell just what size tube it will be safe to use Therefore, I shall continue my little ¼-inch incision through the pleura, being careful to hug the upper edge of the rib so as to be away from large vessels. On nicking the pleura a bead of pus at once appears I will now take this No. 14 French catheter with a few additional fenestrations and, stretching the little intercostal opening, it can be pushed in and proves to be a good, tight fit. The pus you see escaping, as the child coughs up an equal amount, is bloody and thick, very much like that which one finds in abscess of the lung and not at all like the creamy matter ordinarily found in an empyema. I should judge that we have about 1½ ounces of pus from the tube and the child seems to have coughed up fully that amount upon the table, fortunately escaping Miss Rice's operating gown.

To hold the tube in place, I am using this very tiny safety pin, but the catheter is left long and I will now attach one of our thin finger cots to the distal end of the tube, tying it firmly in place with a thread. You see that with each expiration the finger cot bulges and that with inspiration its walls are sucked together. I will now make a generous slit in the end of the finger cot so as to permit fluid and air to escape on expiration, while the suction when the child inhales will draw the rubber walls together, preventing the entrance of air. To be sure, a valve of this kind is by no means perfect, but

with repeated straining respirations the lung will gradually reach the chest wall and we hope will become adherent there When the discharge has become serous and small in quantity we will remove the tube and complete restoration to the normal without further operation may be hoped for.

To hold this tube in place I make use of a small square of thin meshed bandage gauze, slit in the usual manner and laid upon the skin beneath the safety pin Upon this gauze I paint a Johnson and Johnson product known as *duo liquid*, which may be described as a liquid adhesive plaster containing no rubber and which is nonirritating to the skin I spread this with a wooden

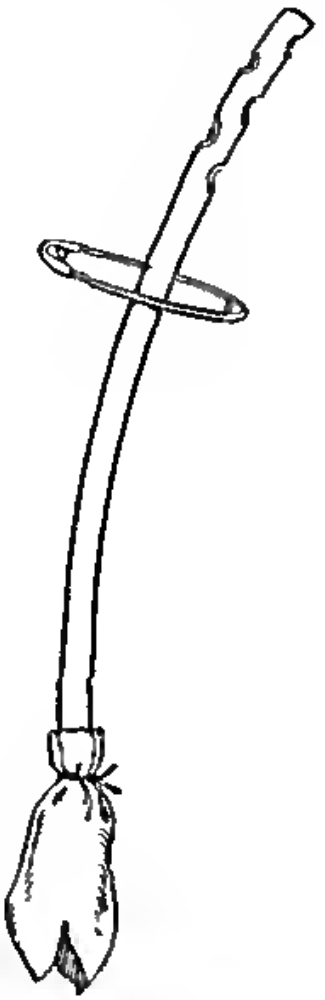

Fig 165 —Case 1 Soft-rubber multifenestrated tube fitted with slit finger cot as valve

spatula and you see it looks like plaster of paris When it dries it will become transparent like collodion Now, I take another piece of the fine meshed gauze and apply it in the same way but on top of the safety pin so that the pin lies between *the two layers* This upper layer *is also* treated by spreading upon it the *duo liquid* This manner of fixing a tube is far preferable to the usual adhesive plaster method, especially in a case of this kind where we hope for a reasonable degree of imperviousness to air (Figs 165–168).

This child appears to me to be already relieved Breathing is much easier and, as you have probably noted, the cough has practically ceased

We will send him to bed with the drainage tube and valve lying perfectly loose in a pus basin by the patient's side Later, we shall rig up a test tube and fasten it to the catheter so that the child can be conveniently moved

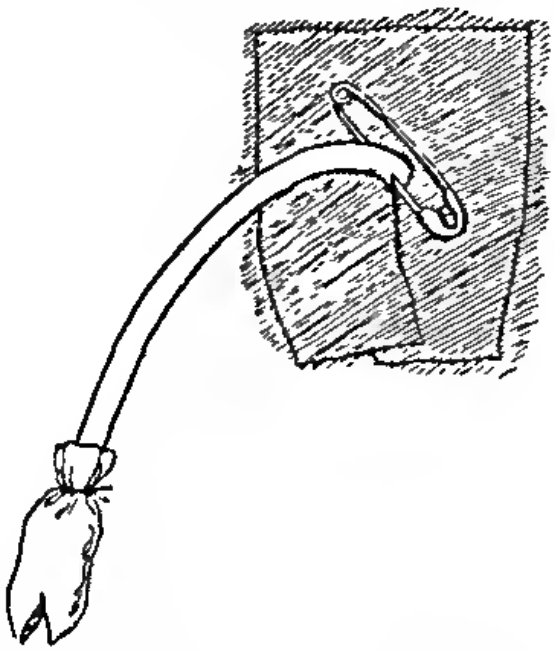

Fig 166.—Case I A slit piece of gauze laid upon the skin and painted down with duo-liquid adhesive plaster.

about When I use this method in adults whether it is for empyema or for various other forms of fistula, especially in the lower thorax or upper abdomen, I employ a whisky bottle instead of the test tube This is flat and, as most

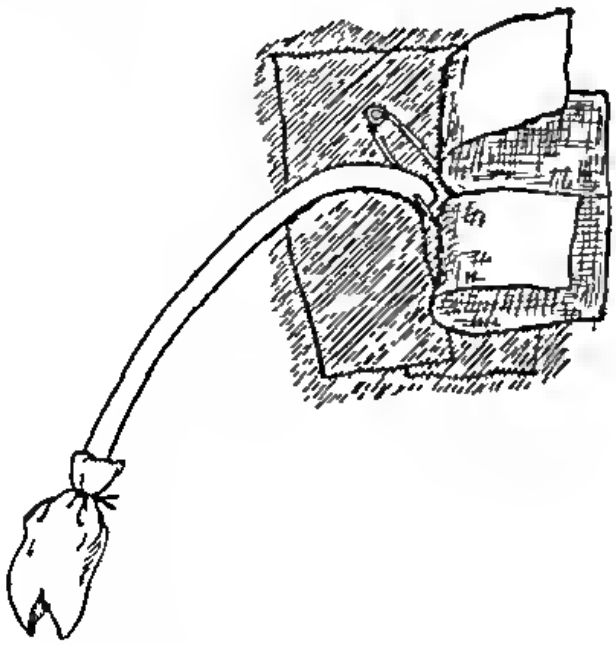

Fig. 167.—Case I. A second slit piece of gauze being laid over safety pin. This will also be spread with duo-liquid.

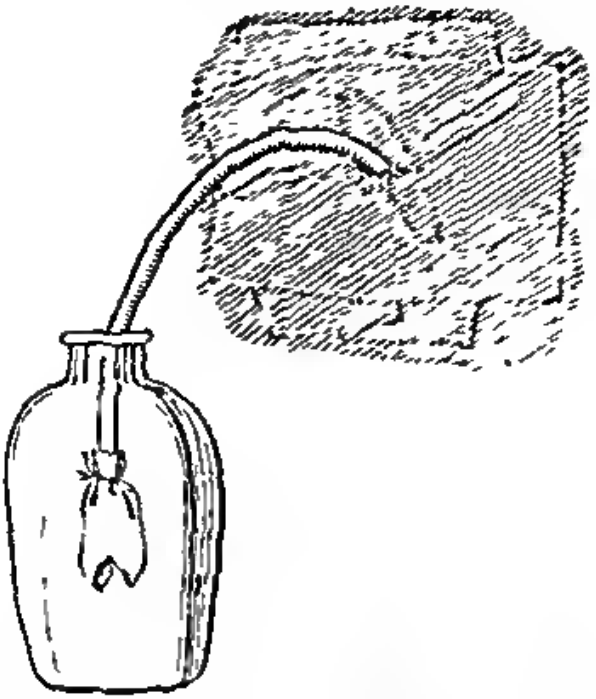

Fig 168.—Case I. The tube in place, being held by the method shown in Figs. 166 and 167 and fitting loosely in the neck of a flat whisky flask, to be worn by the patient.

Fig. 169.—Case I. Four days after operation. The affected chest is clearing nicely. The tube can be seen in place.

of you know, can be carried comfortably upon the hip, and it can be held in position easily with a tape or with adhesive straps It is forbidden, however, to put a perforated cork or any other occlusive substance in the neck of the test tube because the air must have free access so that the valve will work.

Postoperative Note.—I am glad to report that there was an ideal recovery in this case. One week after the operation, it was observed that true empyema had disappeared and that the tube merely lay in a sinus which discharged very

Fig. 170.—Case 1 Baby Bertram R Showing small postoperative scar. Child well

little purulent material. So I shortened it until its inner end lay just within the chest I dispensed with the valve. Eleven days after operation this baby had recovered and was discharged from the hospital. He has remained well and has become a fine normal child (Figs 169, 170).

II. CARBUNCLE OF THE LEFT KIDNEY: RESECTION OF THE UPPER THIRD OF THE KIDNEY

Clinic at the New York Infirmary for Women and Children.—Our patient for operation today is a widow of thirty-eight whom I first saw two days ago in consultation with Dr. Wilhelmina A Ragland of this institution. The patient's remote history throws no light upon her present condition. There

has never been glycosuria. Almost three months ago there was a large carbuncle of the left buttock which gradually healed without operation. Although I did not treat this patient at that time I probably would not have operated because I greatly fear metastatic abscesses from the entrance of bacteria into the mouths of veins in the line of incision. The reason that this is particularly dangerous when operating in indurated infected areas is that the veins are held patulous and cannot collapse as a normal vein does. I have seen cases of metastatic abscess of the lung, of the kidney and of the brain from this cause. To be sure it may be necessary to operate for furuncle or carbuncle if the pus spreads and phlegmon or cellulitis threatens. Otherwise, I have found it better to use a 5 per cent salicylated soap paste and await spontaneous extrusion of the necrotic core.

The interesting feature of this case is that although no operation was performed, the patient began to complain of pain in her left loin beginning about seven weeks ago. Her general condition began to decline. There were malaise and fever. Doctor Ragland instituted all the usual clinical examinations, including catheterization of the ureters and nothing outstanding was found. The urine from both kidneys was clear. The patient had had one chill but her temperature averaged about 101 F. When I saw her there was distinct tenderness in the left loin and tenderness of the left costovertebral angle as well as pain on pressure over the three lower ribs on that side.

x Ray examination failed to reveal any enlargement of either kidney, but there appeared to be a great increase of the liver opacity which ran down to the crest of the ilium. There was, however, not the slightest symptom pointing to hepatic disease. I could not feel the liver, the abdomen being distended and pretty well covered with adipose tissue, but there was some abdominal tenderness even in the right side. On inspection I fancied I could see slight bulging of the left loin posteriorly but I could not be sure of this. With the history of carbuncle and subsequent pain in the renal region, even though this pain had come on much later than it did, my first guess would have been that we were dealing with a cortical renal suppuration without any connection with the pelvis of the kidney and I expressed this opinion in the present case. Later on these cortical abscesses frequently infect the perinephric fatty capsule and we have abscesses often of large size. In the present instance I was not sure whether we were dealing with a perinephric abscess or not, but it seemed to me that operation, even though it were exploratory in character, was necessary.

At Dr. Ragland's request and with her assistance, I am about to explore the renal region and the patient is being anesthetized with nitrous oxide, oxygen, and a very little ether. We will place her upon her well side, lying upon a round pillow so as to make the region between the ribs and the pelvis more accessible. I will now expose the renal region through this long incision which I am making parallel with the twelfth rib and very close to it. There is no technical difficulty and we now have reached the depths. The fatty capsule is incised and the white perirenal fat presents. I think it will be better to prolong this incision forward a little, but we must be careful not to injure the peritoneum. As you see, it is not a difficult matter to push this sac (the peritoneum) forward unopened and to hold it away from the field of operation.

with a wide retractor. I am also having the twelfth rib drawn sharply upward even though it be fractured or dislocated, so as to gain plenty of room.

Here is the lower pole of the kidney. It does not look diseased and certainly we are not dealing with a perinephric abscess I shall attempt to withdraw the kidney and to examine its upper pole for discrete abscess. This may even be of small size and yet produce severe symptoms I think it was in 1888 that I published in the Annals of Surgery a case of this kind in which there were abscesses of both kidneys and in which bilateral nephrotomy was done The infection had followed erysipelas of the face and necrosis of the mandible. The patient finally recovered Another case I had was at Bellevue a few years ago, in which the same condition was encountered following a phlegmon of the arm This man later had signs of pulmonary suppuration as well and there was x-ray confirmation, but fortunately recovery took place without the necessity for operation. I remember the case well because when the patient was very ill he insisted upon being married and the priest united him in holy matrimony to his present wife in a room off the ward in Bellevue Hospital

During this highly edifying monologue you will see that I am working and trying to deliver the kidney, but it will not come. There are indurated dense adhesions at the upper pole fixing it firmly to the diaphragm I fear we shall have to divide this twelfth rib close to the spine so that we may get room enough to see what we are doing

Ah, now the case is clear! Apparently, we have here a mass of typical carbuncular tissue with myriads of small abscesses occupying fully the upper third of this kidney I think we shall be able to shell out this carbuncle without actually cutting it away and possibly with considerably saving of blood. There! You see it has come away nicely and I shall pass it to you for your inspection There is astonishingly little hemorrhage and I see no urine, so let us hope we have not been obliged to invade the kidney pelvis itself This is a large carbuncle, it takes in fully one third the bulk of a normal kidney. We shall pack this wound with gauze and leave it wide open for the present

Postoperative Notes.—Six days after operation, the packings were removed and two small drainage tubes were placed in the upper part of the wound where the carbuncle had been There were attacks of abdominal distention, there was a chill but with the temperature rising only to 100 6 F., and I began to wonder whether this patient might not have had some additional metastatic abscess Gradually, however, she began to improve and at the same time there was a discharge of urine through the wound The remaining part of the kidney lay close to the surface Doctor Ragland strapped the skin together and gradually the wound healed so that the patient went home Then, however, it reopened and began to discharge small quantities of urine To make sure that the ureter was free, I catheterized her left ureter and injected methylene blue which at once appeared in the fistula, proving that the ureter was pervious Later on I injected a dye into the sinus after removing the tube The dye came through immediately and was found in the bladder urine. The wound then closed and opened intermittently, finally closing completely, and the patient has now been well for about six months.

I do not like to catheterize the ureter merely for my own curiosity, but can see no other way to distinguish the urine of the left kidney from that of the right. Even the most miraculous action of the iodine dye which has recently been discovered by Dr. Swick of New York would not help us here, although it would be interesting to make the intravenous injection and get a new *x*-ray picture of her urinary tract An *x*-ray picture taken during the later course of the case showed the left kidney cut square off at the junction of the upper and middle thirds.

III. A CASE OF ABSCESS OF THE LEFT UPPER PULMONARY LOBE: THORACOTOMY AND DRAINAGE

Private Pavilion, Mt Sinai Hospital—The patient before us today, Bennie N , is twenty-seven years old He was referred to me about two weeks ago by Dr K W Buell More than two years before his tonsils had been removed under general anesthesia with ether The operation was apparently not unusual and for the following ten days there were no untoward symptoms Then, however, cough began and rapidly increased both in frequency and in the quantity of sputum discharged until when I saw him there were about 8 ounces a day The gangrenous stench so frequently encountered in these cases was here superlatively present He had been treated in one of our best hospitals by artificial pneumothorax but without improvement Eight ounces is far from being an extreme amount of sputum in abscesses of the lung following tonsillectomy, on the contrary, I have seen as much as 1000 c , or more than 30 ounces, from a bronchiectic abscess of the middle lobe alone In that case, the patient recovered after complete extirpation of this pulmonary lobe and she is one of my most grateful friends There is no objection to treatment by pneumothorax in early lung abscess and there are reports of apparent cure even after more than a year of this type of therapy

Bronchoscopic treatment, in the earlier cases, has been followed by great improvement and in some instances by clinical cure, but in an abscess of many months or years little can be accomplished except relief, and the therapy must be indefinitely continued Bronchoscopy is very valuable, however, as a diagnostic measure in all cases of abscess of the lung, first because an unsuspected foreign body may be found and removed and, second, because it is possible by this means to form an idea of the location of the abscess This is usually determined by observing from which bronchial opening the pus exudes However, mistakes may arise even here and through no fault of the bronchoscopist for I have seen an abscess of an upper lobe which had perforated into the bronchus of the lower lobe, thus producing great confusion

When I first saw this young man he was in a miserable condition, coughing constantly and with daily fever There was great emaciation—by no means a constant accompaniment of this disease His fingers were clubbed An *x*-ray examination by Dr Jaches revealed a characteristic lung abscess of the

upper lobe with a level fluid line (Fig. 171). In the lower chest there was still some air from the artificial pneumothorax and there was another fluid level, pleural in character, and probably not purulent. The cavity of the abscess was diagnosed as being near the anterior chest wall and its central part was at the level of the third rib.

We shall use local anesthesia in this case and attack the disease from the axillary region I have found that this approach gives more certain access than any other in upper lobe or apical suppuration although it has the disadvantage of requiring deep dissection since the ribs here are always much farther away from the skin than one might carelessly imagine Whether the abscess is in front or behind it can be reached through an axillary wound.

Fig 171.—Case III. Preoperative roentgenogram showing upper lobe abscess with fluid level and remains of an artificial lower pneumothorax with an intrapleural fluid level.

Therefore, I will anesthetize a line running along the fourth rib obliquely upward and backward toward the axilla, and I will also anesthetize a line at right angles to this extending downward and backward It is evident that drainage should be as near the bottom of the cavity as possible without running the risk of entering the pleura, a serious though by no means uniformly fatal accident.

I am now making this incision in the line of my anesthesia and it happens that the 4 inches apparently suffice I have anesthetized the skin alone with my hypodermic needle using 1 per cent novocaine with a dash of adrenalin. Two cc of this solution is sufficient to produce anesthesia in the line of my operation. Now, however, I must benumb the deeper parts For this pur-

pose I am using only 0 5 per cent novocaine I do not make a large infiltration of the operative field but only inject where I intend to cut You will observe that my assistant is clamping the vessels before they are divided and the patient quite naturally complains of the pain when an artery is caught. Therefore, I shall divide the vessel at once and tie each end It is interesting to see how the instant the ligature is in place and the forceps removed all pain ceases It is of course not possible—certainly not practicable—to anesthetize the nervi vasorum I consider this immediate attention to each vessel as it is caught a very important point because if this is not done there will be much unnecessary pain Otherwise the operation merely produces discomfort from the retraction and mauling of the tissues

Fig 172—Case III Roentgenogram long postoperative The tube is shown in place The lung has cleared, but fibrosis, of course, is present There is no longer a pneumothorax below The fluid has also disappeared so that the line of the diaphragmatic dome is easily seen A stringlike adhesion pulls this dome upward into a tentlike shape

Having exposed the fourth rib well into the border of the armpit I find it *necessary* to enlarge the wound by making the auxiliary incision which I have outlined at right angles to the central portion of our main line. *Having completed* this we can easily retract the flaps front and back, upward, and downward The incision is in the form of an oblique capital letter T, but when the two angles where the vertical joins the horizontal are separated

the wound becomes larger and the parts below easily accessible. When securing vessels in this part of the body or for that matter in any other part it is a great help to know the direction of the blood current. In this locality the main current is from the armpit downward both backward and forward and the artery clamps can be much more intelligently applied if one remembers this distribution

We are now down upon the ribs and I shall use a few drops of the stronger novocaine solution for anesthetizing the upper and lower edges of the third rib and the lower neurovascular bundle of the rib above and also the upper edge of the rib below. In order to expose perfectly, I will now divide some of the fibers of the major pectoral muscle by cutting them crosswise. Some of the minor pectoral and part of the serratus must also be cut and retracted so that we may see accurately what is being done. I intend to resect the third rib so as to avoid any danger of violating the pleura These ribs reform very rapidly if the periosteum is left and since the period of convalescence will be long it is necessary to prevent this. I shall, therefore, remove about 2½ inches of the bone together with its periosteum The intercostal artery spurts a little in spite of my having crushed it with my bone cutting forceps and so it must be ligated

We are down upon this dense tough tissue which I believe to be the wall of the abscess itself The patient is lying with his head lower than his chest, always important to prevent air embolism of the brain, and we will aspirate through this large needle. The tissue is indeed dense and I am using an astonishing degree of force to push the point through into the cavity. I must be very careful that the needle shall not suddenly enter the abscess and reach the opposite side, perhaps even perforating a vessel So when I push the needle I hold my index finger against it so that it cannot go too far There! I feel that the needle is within a cavity. On attaching the syringe and making suction at first apparently nothing is drawn into the barrel I am certain, however, that we have withdrawn gas because of the ease with which the piston was withdrawn. I shall now detach the syringe from the needle and empty it of its gas which those of you who are near enough can easily detect by its fetor. This patient is lying partly upon his side, and my needle having not reached the level of the pus, I shall cautiously introduce it a little farther. Replacing the syringe and making suction we find extremely thick, tenacious pus I will enlarge this opening with dissecting scissors which I carefully insert along the needle tract with blades closed, now I separate them This maneuver has provoked considerable spasmodic coughing, a rather common phenomenon at this stage, and thick, putty-like stinking material is ejected through the wound. I can now explore this cavity with my finger and I find that it extends upward and backward as well as downward. In order to be sure of being as near as possible to the bottom of the cavity I shall take away about 1½ inches of the next rib below. I am using the same technic that I did with the resection of the other rib and I will even remove some of the roof of this abscess with my scissors We have been particularly fortunate here not only with the exposure but also in the very slight blood loss and with the anesthesia which, judging by the behavior of the patient, is very nearly perfect.

I am afraid of using a tube in a recent abscess cavity and I also fear even gauze at this first packing So let us employ my favorite material, rubber dam This is far from an ideal drain but it will at least fill the cavity and even tend to make it a little larger. When the dam is removed, which will be in two or three days, there will be no pain and there is no adhesion to the deeper, perhaps vascular, walls of the abscess We will dress this wound with a small quantity of dry gauze held in place with a broad piece of adhesive plaster which must not extend beyond the midline front or back, but which I run up obliquely to just behind the shoulder blade Judging by his behavior

Fig 173.—Case III Mr B N Patient about to insert rubber plug. Note clubbing of fingers. No dressing of any kind is worn

I believe this patient is distinctly relieved even now, immediately after operation

Postoperative Notes.—The packing was removed and replaced by gauze and then by a piece of very soft pure rubber tube I do not like the ordinary drainage tubes in pulmonary abscess because with only the slightest touch upon the vascular wall there may be erosion, and secondary hemorrhages may occur Gradually we reduced the size of the tube until it was about equal to a No 24 French sound

Bennie was discharged four weeks after his operation still wearing a tube About every two weeks he came to the office to report and gradually the

fistula lined itself with skin The cough almost disappeared except in the morning, but he had to wear a dressing, although there was no longer any odor and the discharge had assumed the characteristics of mucus rather than of mucopus When I found that the discharge amounted to only about a dram a day I hit upon the plan of using a rubber ligature instead of a rubber tube, and my patient was greatly pleased with this expedient. At present I see him every few months His occupation is that of a taxicab driver and he loses no time because of the occasional inclemency of the weather He has married since his operation and supports a family. The plug of rubber liga-

Fig 174.—Case III. Close-up showing rubber plug in fistula

ture is removed by him twice a day and on coughing a few cubic centimeters of nonodorous mucus are expelled The plug is about 3 inches in length. He uses a jelly-like toilet preparation known as *telogen* to lubricate the tube when he inserts it. The advantage of *telogen* is its solubility in water. I do not like to use vaselin for this purpose because it is liable to pile up in the cavity. There is no discharge upon his clothing He does not wear a dressing of any kind I have suggested a plastic operation to close the fistula, but he tells me he is so comfortable that he does not wish to give up the time which such a procedure would require.

CLINIC OF DR. CHARLES LANGDON GIBSON

FIRST (CORNELL) SURGICAL DIVISION OF THE NEW YORK HOSPITAL

THE DIAGNOSIS OF CHRONIC APPENDICITIS

CHRONIC appendicitis is a very common condition and besides the inherent danger of an acute attack, often causes serious deterioration of health and disturbances of varying degrees, particularly of the gastro-intestinal tract. As will be pointed out, the signs present a wide range of latitude and many conditions are confused.

The only sure diagnosis in most cases are the history and observation of a patient who has had an unquestioned acute attack.

Without typical acute attacks, the three principal symptoms, separate or together, are pain, gas, and indigestion. When repeated attacks occur, particularly in young individuals, a presumptive diagnosis of appendicitis is justified.

A third picture is devoid of any typical symptoms; but there is a sense of oppression in the abdomen—discomfort rather than pain.

In some of these patients only indirect symptoms, such as result from focal infection, lassitude, mild deterioration of health and often a peculiar sensitiveness to cold, exist.

The symptoms of chronic appendicitis are modified by the structural changes. With a true chronic inflammation, thickening of the several coats, especially catarrhal inflammation of the mucous membrane, the pain is apt to be more of a steady pain. When the lesion is more mechanical, that is a relatively healthy organ, but distorted or kinked, the pain is more apt to be colicky in character, representing the efforts of the appendix to empty itself. The same kind of pain occurs in the first form when

strictures have developed, modifying the picture by this mechanical phenomenon, and likewise with the formation of concretions.

Finally, very marked chronic appendicitis may exist without giving a single sign, local or constitutional, until a typical acute attack necessitates operation. In the noncharacteristic cases the diagnosis will have to be made by elimination of the other conditions. In other words, the important features are careful examinations and investigations.

The whole range of conditions which may somewhat simulate appendicitis is very large (see Table 1). Some, of course, are quite remote; but it is possible that the list, although large, is incomplete

TABLE 1

DIFFERENTIAL DIAGNOSIS OF CHRONIC APPENDICITIS

Cholecystitis	Pleurisy
Abscess of liver	Herpes zoster
Renal colic	Hysteria
Nephritic and perinephritic abscess	Certain forms of allergy (honey)
Movable kidney	Obturator hernia
Gastric ulcer	Auto-intoxication
Perforation of duodenal ulcer	Gastric crises of tabes
Chronic pancreatitis	Ruptured graafian follicle
Acute indigestion	Sacro-iliac disease
Intestinal obstruction	Pneumococcus peritonitis
Thrombosis of mesenteric vein	Lead colic
Tuberculous ulcers of cecum	Acute mesenteric adenitis
Simple ulcers of cecum	Colitis
Tumors of cecum	Ulcers of ileum
Tuberculosis of spine	Harris Land
Pyosalpinx	Pregnancy
Ovarian cyst with twisted pedicle	Scarlet fever
Abscess of ovary	Carcinoma of appendix
Abscess of abdominal wall	Osteo-arthritis of spine
Incipient inguinal hernia	Pressure of nerve by last rib
Dysmenorrhea	Acidosis in children
Inflammation of right spermatic cord	Weil's disease
Tuberculous peritonitis	Extra-uterine pregnancy

A gastro-intestinal series will often give evidences of disturbances in the appendix, for instance showing the retrocecal position of the appendix or down in the pelvis or the unusual condition of kinking or snarling—"pug dog tail."

It may also show in the fluoroscopy that the appendix and cecum have lost their normal range of mobility, indicating the presence of adhesions. These signs are particularly valuable if they are present forty-eight to seventy-two hours after the ingestion of the barium.

The more common conditions are gastroduodenal ulcers and the gallbladder. For these conditions, expert fluoroscopy and the use of the Graham test are indicated. In women, various conditions of the pelvic organs, particularly a right salpingitis, will have to be eliminated. Renal stones, particularly in transit, may be revealed by *x*-ray plates

We have had on our service at the New York Hospital a very interesting experience of what may be done in improving results by great care in diagnosis. These results have been pointed out in two papers on chronic appendicitis published in the American Journal of the Medical Sciences[1] and one paper in the Annals of Surgery[2] on "The Educational Value of the Follow-up (A Fourteen Years' Report) "

In our first year the bad results were as high as 30 per cent. The results began to improve as soon as we took up the matter seriously. In our most recent follow-up, covering the first six months of 1929, we followed 64 cases without a single bad result.

We see frequently cases of appendicitis in individuals who have become hypochondriacs because some doctor without evident reasons has told them they have appendicitis.

Finally, the exact diagnosis of the condition sometimes only can be made at operation. In must be remembered that many individuals suffer from other lesions besides an obviously chronic appendix and that an appendectomy still leaves the patient with a source of complaint.

My belief is that with rare exception every operation for chronic appendicitis should be an exploratory laparotomy, allow-

[1] The Results of Operations for Chronic Appendicitis, a Study of 555 Cases, Amer. Jour Med Sci, May, 1920, vol clx, No 5, p 654. End Results of Operations for Chronic Appendicitis (2nd Series), Amer Jour. Med Sci, December, 1924, vol 168, No 6, p 807

[2] Educational Value of the Follow-up (A Report of Fourteen Years), Annals of Surgery, October, 1928, vol lxxxviii, No 4, p 772.

ing a proper investigation of the stomach, duodenum, gall-bladder, both kidneys and the pelvic organs. We have seen a number of distressing conditions where the appendix has been skinned out through the so-called McBurney incision and the important lesion has been overlooked. In 3 cases we have operated on malignant growths of the ascending colon which have been in close proximity to the appendix, but had been recognized.

CLINIC OF DR. WALTON MARTIN

St. Luke's Hospital

PREGNANCY FOLLOWING ENUCLEATION OF BILATERAL OVARIAN DERMOIDS, AND PANKOW'S OPERATION FOR RETRODISPLACEMENT OF THE UTERUS

I WISH to bring to your attention a patient whom I have had under observation for six years.

In 1924 a married woman, twenty-six years old, who had borne one child consulted me for dysmenorrhea, persistent backache and intermittent pain, very severe at times, in the lower portion of the left side of the abdomen She was well nourished, and in good health except for these ailments

On vaginal examination, the uterus was well back from the symphysis but not actually retroverted and contained no palpable growth On the left side there was a cystic mass 2 or 3 inches in diameter, probably from the left ovary There was a feeling as if, in addition, posterior to the uterus there was a second cystic mass probably arising from the right ovary

There was a slight laceration of the cervix, neither anterior nor posterior vaginal wall was relaxed

She was advised to have an operation, as the possibility of a cyst in each ovary had to be considered, and delay might cause further damage as the cysts increased in size Moreover, it seemed probable that it would be necessary to suspend the uterus as that organ was already further back from the symphysis than normal and would probably drop still further back when the cysts were removed.

As she was a young woman and greatly concerned about bearing more children she was told that every effort would be made to preserve ovarian tissue

On November 20, 1924, under ether anesthesia, the abdomen was opened by a median incision The uterus was found displaced backward and in the position of each ovary was a roundish cyst about the size of a lemon (Fig. 175). There was no small mass of normal looking ovarian tissue to be seen, the cysts seemingly replacing the ovaries

My associate, Dr Frank Matthews, had called my attention some time ago to an observation he had made while making routine microscopical examinations. He was much impressed by finding a corpus luteum forming a prominence on the thinnest portion of the wall of a large ovarian dermoid As it grew the dermoid had thinned out the ovarian tissue but had caused no

other recognizable change He had also told me that he had in several instances enucleated such cysts and that the women had menstruated normally after recovery from the operation I had also had several experiences, as very many others have had, showing how small a fragment of ovary, left after resection, may be followed by normal menstrual life

In this instance I made no attempt to resect the ovary but made an incision through the tissue down to what appeared to be the cyst wall and then enucleated the cyst by blunt dissection When finished I closed with a continuous suture On section of the cyst, the contents, hair, fat, and a small

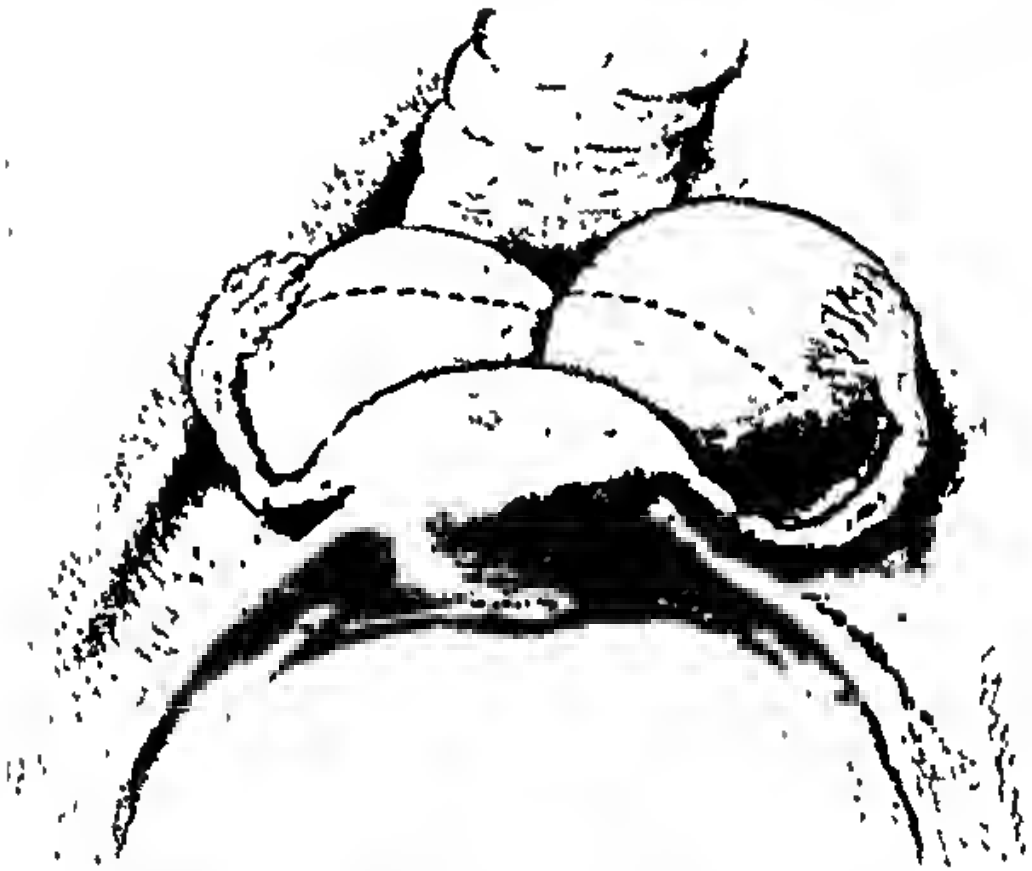

Fig 175

mass of bone showed it to be a dermoid, so that the same procedure was carried out on the opposite side After removal of the cysts the fundus of the uterus dropped back into the pelvis

I then suspended the uterus in the following way. The round ligament was grasped by two Allis clamps near its middle, that is, about 1 5 cm from its attachment to the uterus, and divided between the clamps (Fig 176). The incision was then continued into the broad ligament for about 1 cm The small bleeding points on the divided stumps were clamped and ligated The distal portion of the round ligament, that is the part attached to the abdominal wall at the internal abdominal ring, was then drawn taut by traction on the Allis clamp, so that a small cone of peritoneum became prominent

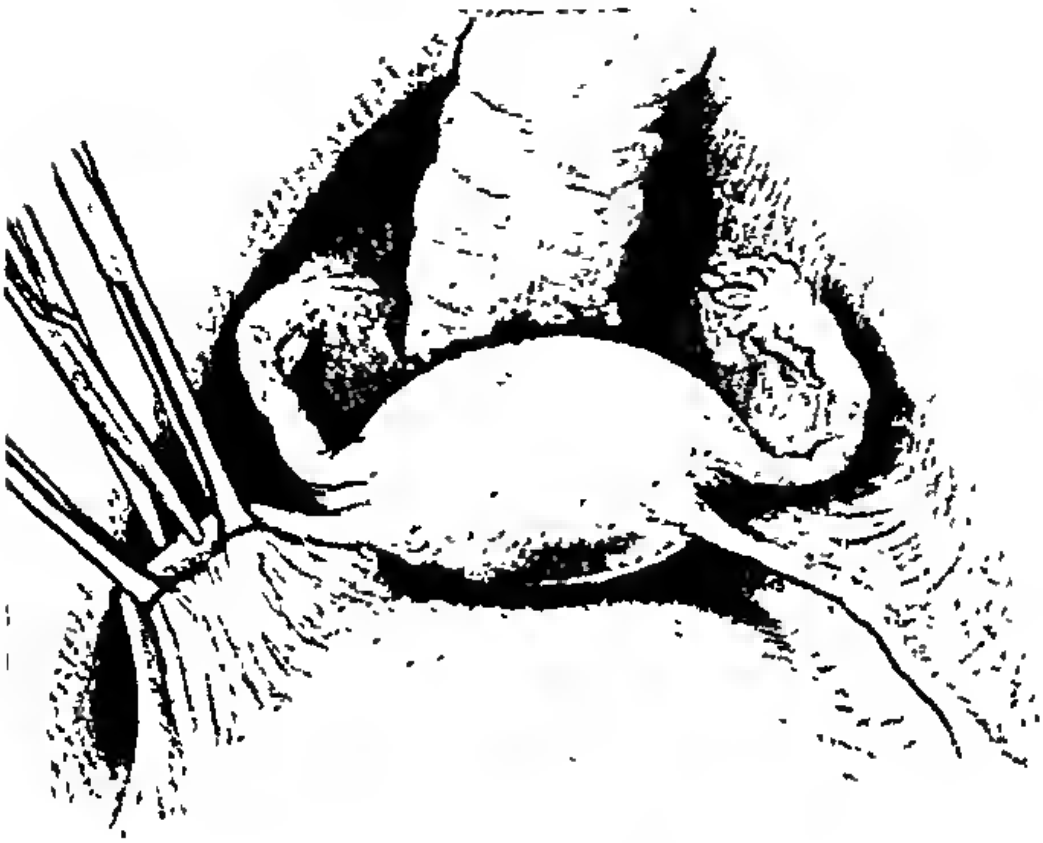

Fig. 176.

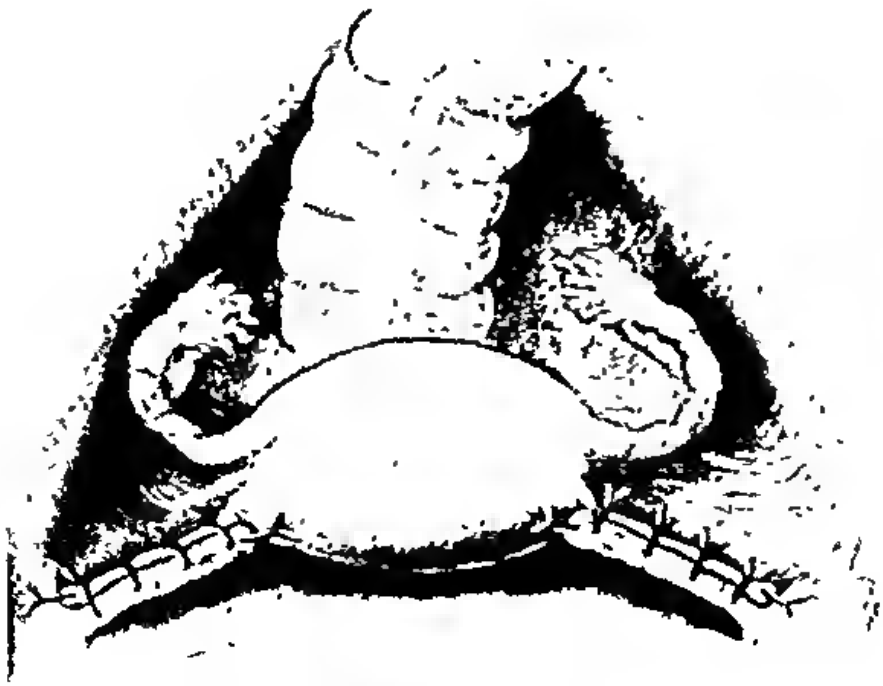

Fig. 177.

at the internal ring, and the stump of the proximal portion of the ligament, that is the portion attached to the uterus, sutured by a fine chromic gut stitch to this cone in such fashion that the raw surface of the cut end was turned toward the peritoneum The distal end was sutured in similar fashion to the body of the uterus exactly anterior to the attachment of the round ligament Then the two cords of round ligament were united by interrupted sutures (Fig 177) The same procedure was carried out on the opposite side The uterus was thus drawn forward into a normal position by a reduplication of the round ligaments, the thin, cordlike central portion being reinforced at each end and fastened to the strong fixed portion of the ligament, and there was not only accurate apposition of the halves of the round ligament, but a considerable overlapping of the broad ligament anteriorly Further the uterine tubes were in no way distorted or kinked The appearance as one looked at the completed operation was of the normal anatomical one except for a thickened and reduplicated round ligament

The patient recovered from the operation, and thereafter menstruated *normally Two years later she gave birth to a child The uterus involuted* normally, and has continued in normal position She is entirely free from pain or discomfort She dives, plays tennis, and has recently been skiing She tells me that she has fallen many times in many different positions, but that she has had no abdominal discomfort or pain

I have brought this case report to your notice for two reasons In the first place, the young woman became pregnant after the enucleation of bilateral ovarian dermoids In a paper by Dr Frank Matthews in 1925 on "Management of Bilateral Ovarian Dermoid," the concluding sentence is "Pregnancy has not occurred after bilateral enucleation in any of the patients." Among the patients included in his report is the one I am now presenting She has since then borne a child. In Pfannenstiel's monograph on the diseases of the ovary he writes that A. Martin, Pozzi, Matthaei, and Olshausen have reported pregnancy following ovarian resections I do not know the details of these reports nor in how many bilateral ovarian dermoids were enucleated, nor the size of the cysts resected. In the case reported microscopical examination of section of the cyst wall showed adherent ovarian tissue, although every effort was made to carry out the enucleation gently and to follow the natural line of cleavage

The second reason I have for presenting the report is to show a very satisfactory method of suspending the uterus. Anyone with a slight sense of humor would hesitate, I think, to bring forward a new method of round ligament fixation. I

remember seeing somewhere the statement that over ninety methods of round ligament shortening had been devised. I have further read that in a large series the results were favorable in over 94 per cent, irrespective of the method. It has been my usual practice to use Gilliam's operation, and it has proved satisfactory. Only two unfavorable results have come to my notice; in one an intestinal obstruction resulted and in another the tube had been pulled up with the round ligament causing extreme pain. I do not know where the operations were performed on these patients. They came to the hospital for treatment for the complication.

About twelve years ago I began occasionally carrying out the procedure I have described, and my associations on my division have in recent years done the same. The results have been so satisfactory that we have continued

When I searched through the medical writings of the last fifteen years, I found that Pankow had described the operation exactly as I have given it, in 1916, excepting that he made it a little more complicated in that a small incision was made in the uterus and the stump of the divided proximal portion of the ligament thrust into the incision. I am free of the reproach of introducing another round ligament operation, and am only bringing to your attention one fourteen years old

The young woman whose case history I have reported is the daughter of an intimate friend, and has been brought up to give expression to even the slightest discomfort. As I have occasion to see her not infrequently I can report the follow-up in this patient with unusual accuracy

CLINIC OF DR. CHARLES E. FARR

NEW YORK HOSPITAL

LIPOMA OF THE COLON

THIS apparently rare condition is described by many of the pathologists and has been reported not a few times in literature.

Adami[1] in referring to peritoneal lipomata states that a form of lipoma is occasionally met with arising from the submucous layer of the intestine where it may develop into solitary pendulous or pedunculated masses which have led to intestinal obstruction. MacCallum[2] states that lipomata may be found in the submucous and subserous tissues of the whole alimentary tract. Delafield and Prudden[3] point out that lipomata may arise from the submucous coat of the intestine and grow inward encroaching upon the lumen, or from the subserous coat and grow outward into the peritoneal cavity. Quoting from the authoritative work of Ewing[4]: "In the gastro-intestinal tract lipomas are of rare occurrence. They arise from the submucosa and from the appendices epiploicae of the colon. Dewis collected 44 cases, in 9 of which the tumor was expelled spontaneously, while intussusception occurred in 21. The subserous lipomas may be worked loose in the peritoneum. Ehrlich has collected 52 cases of intestinal lipoma. In the gastric submucosa small fatty tumors may occur. I have observed a large fatty tumor, 4 by 10 cm. surrounding the appendix which was the seat of chronic suppuration."

K. Brandes[5] very recently reported a case of diverticulum of the jejunum associated with a lipoma. Horsley[6] also recently reported a case of intestinal lipoma causing intussusception followed by gangrene in the abdominal wall. Lewisohn[7] has reported a case, the résumé of which will bear repetition. A

woman of fifty had complained of right abdominal pain for two months The pain came on in intermittent, severe attacks of short duration There was abdominal distention in between the attacks No blood was found in the stools. Abdominal examination showed a round, nodular, movable mass just to the right of the umbilicus Roentgen ray showed a growth protruding into the lumen of the ascending colon At operation a pendulous tumor the size of a plum was found arising from the inner wall of the ascending colon, the base of which was soft but the distal portion was hard and nodular An extensive resection was done because the consistency of the distal portion of the growth suggested malignancy The pathologic report showed it to be a lipoma with the distal half gangrenous The gangrene was thought to be due to constriction of the ileocecal valve in which the tumor had been caught at intervals, causing the intermittent obstruction symptoms.

A similar case of lipoma of the ascending colon has been reported by Westbrook,[8] while lipomas of the descending colon causing intussusception have been reported by West[9] and Wharton.[10]

W M , thirty-eight years of age, entered the New York Hospital June 21, 1927, was operated upon by another surgeon, and was discharged July 5, 1927 The following is a summary of his history, physical examination and operation at that time.

Chief Complaint.—Abdominal discomfort, duration three and a half years, constipation for three and a half years

Present Illness.—The patient was operated upon for rectal abscess three years ago Since then he has had to have daily enemas to insure bowel movements He has experienced abdominal distress for about one half hour following the enemas No blood has passed by rectum except upon examination of this region

Past History —Measles No other disease remembered No other operation or injury except as above

Present History.—Rare headache Eyes, ears, nose, and mouth negative He has had occasional sore throat He has had no pneumonia, no pleurisy, no chronic cough and no hemoptysis, no dyspnea, no palpitation, no precordial pains His appetite is fair. He has had no nocturia, hematuria or dysuria His joints are negative as is his nervous system

Family History.—His father is living and well His mother died of cancer of the stomach A brother and a sister are living and well.

Physical Examination —The patient is a well developed, well nourished

young adult white male He is not acutely ill and is in no apparent distress. There are no masses and no points of tenderness in the head His pupils are equal and react to light and accommodation The sclerae and conjunctivae are normal The ears and nose are negative to external examination His teeth are in fair repair and his tongue is clean His tonsils are small, deep, and buried, but there is no exudate There are no masses and no abnormal pulsations in the neck His chest is full and well developed with good expansion, equal on both sides His lungs show good resonance throughout, the breath sounds are unchanged in quality, no adventitious sounds are heard His heart is not enlarged and the sounds are of good quality and regular No murmurs are heard. His pulse is full and well sustained The arteries are not palpable

The wall of the abdomen has good tone There are no masses and no scars There is slight tenderness on pressure to the left of the umbilicus and slightly downward No viscera are felt. There is tympanitis over the right lower abdomen The genitalia are normal The prostate is not enlarged and there is no rectal tenderness There is neither deformity nor swelling of the extremities The knee jerks are equal and active and no Babinski is present

Operation.—*Division of Adhesions About Sigmoid, Appendectomy*.—The abdomen was opened through a lower left rectus incision. The sigmoid colon was bound down to the side wall of the abdomen by adhesions which produced a kinking of the colon These were divided, the bleeding points were secured, and the raw area covered The appendix was then drawn up into the wound It was long, sclerosed, and markedly kinked on itself due to old adhesions The appendix was removed in the usual manner, cauterizing and inverting the stump with two purse string sutures The wound was closed in layers. Dry dressing.

Pathologic Report.—The specimen consists of an appendix 5 cm long and 0 5 cm in diameter The serosa is smooth and pale Histologic sections show fibrotic obliteration of the appendix

The postoperative recovery was without incident and the patient left the hospital greatly improved He remained well until January, 1928, when his symptoms returned and increased On October 11, 1928, he re-entered the hospital

Second Admission to Hospital.—The patient felt well until January, 1928, when he began to feel weak, tired, and was easily fatigued with loss of appetite and night sweats He began to have cramplike pains before each bowel movement and the movements were followed by definite chills and fever, the temperature going as high as 104 F at times Between movements he began to pass grayish fluid with definite clots of blood About March, 1928, pain began after each meal The pain is in the left upper quadrant and radiates down to the left lower quadrant The patient describes the pain as a "sorelike sensation," the soreness lasting for days Within the last six months he has lost 6 pounds in weight

Physical Examination.—The patient's general appearance is that of a well developed, anemic-looking man of forty, apparently chronically ill The head, eyes, ears, and nose are negative A few anterior cervical nodes

are palpable in the neck, but there are no abnormal pulsations The lips are pale, the tongue clean, the teeth in fair condition The pharynx is negative, the tonsils small The thorax shows symmetrical excursions The lungs are resonant throughout except in the upper left part, where the breath sound is diminished and roughened, left anteriorly The apex of the heart is 10 cm from the midsternal line, fifth space The sounds are of good quality The muscular wall of the abdomen is good A suprapubic midline scar is seen There are no masses, but the abdomen is tender in the right and left lower quadrants It is not rigid The knee and ankle jerks are active

October 14, 1928 Rectosigmoid examination reveals much free blood and pus No ulcers or polyps are seen, but the field is obscured

October 16, 1928 Fluoroscopic findings no evidence of any organic defect of stomach or duodenum

Roentgenologic Report on Colon.—Barium enema fills the colon easily and completely. The rectal sigmoid region is unusually small and narrow in appearance and the usual distention of the rectal ampula is not noted The descending colon seems quite normal in appearance, but the transverse colon, ascending and cecum are very markedly distended After evacuation the bowel is very well emptied, being outlined by fragments of barium only, and there is nothing conclusive of carcinoma, though a slight narrowing in the sigmoid with slight jagged outline may possibly indicate such a condition Early diverticulitis is also a possibility

The patient remained in the hospital only six days and left against advice. During this time he ran a very slight fever and showed a moderate secondary anemia After leaving the hospital he went abroad for several months to rest, but showed no gain and was finally readmitted August 20, 1929

Third Admission.—At this time he was pale and appeared chronically ill A definite mass had formed in the rectum about 4 inches above the sphincter, causing a partial intestinal obstruction Much pus and blood were discharged

Operation was performed under spinal anesthesia The old laparotomy scar was reopened Many adhesions were found In the left true pelvis was a fatty tumor infiltrated with pus and firmly attached to the sigmoid colon It was impossible to free or resect it and a first stage Mikulicz operation was done The patient did well for three days but then developed a paralytic ileus and died two days later in spite of a jejunostomy

The pathologic report on the Mikulicz specimen showed only acute inflammation with hemorrhage and some old scarring The pathologist's report on the partial postmortem examination is appended in full

Postmortem Examination.—***Inspection***.—Shows a poorly nourished but fairly developed middle-aged white male in advanced rigor. There is a midline incision from pubis to umbilicus through which protrudes a greatly indurated loop of bowel and a smaller upper left jejunostomy wound. Autopsy was limited to these wounds

Local Condition.—The sigmoid was freed from the abdominal wall and the rectum transected as low as possible and colon near the splenic flexure This segment of bowel presents the essential lesions in the case and consists of about 4 inches of natural appearing colon above the mass and 4 inches of

indurated but otherwise not diseased rectum and sigmoid below the mass. The mass itself is about the size of a grapefruit though flattened from side to side and is formed of a large definitely lobulated yellow mass which occupies the meso of the sigmoid and the sigmoid itself which practically circumscribes the circumference of the mass The tumor in the meso is more indurated than lipomata are though it resembles these tumors in its color and pattern The induration seems to be due to thickening and sclerosis of the septa between the lobuli The sigmoid associated is thickened to approximately three times normal and all the coats join in this increase in thickness There is no evidence of diverticulae felt or new growth of the bowel itself and its mucosal surface is completely intact and smooth and light pink in color The lymph follicles are pronounced in appearance throughout the sigmoid and rectum in part The sigmoid overlying the tumor has been opened (at time of operation) but the distal half is closed and admits the passage of the index finger only with great difficulty, presenting therefore a pronounced degree of chronic obstruction No evidence of acute infection, such as pockets of purulent material, nor of caseation were found and there is no annular stricture of the large bowel

Peritoneum is essentially negative excepting around the large operative wound where some fibrinopurulent reaction is identified and has resulted in adhesions between loops of the jejunum The small bowel above this is greatly distended and filled with fluid but is thoroughly viable and judging by the condition of bowel and adhesions this obstruction represents a very late complication

Stomach is distended with fluid but shows no other lesions

The bladder is natural and the prostate only slightly enlarged

The right seminal vesicle is distended with brown mucoid material.

Histologic evidence is as follows

The mesosigmoid has been sampled in many places. It shows great amount of areolar tissue though no young fat cells are present and the evidence for true lipoma is not positive

However, the amount of inflammatory change in it, while constant throughout, is not great and does not account for its size.

The area of constriction shows extensive scarring and pronounced inflammation with young granulations

No new growth present, no evidence of diverticulae or polypi though due to the constriction and inflammation the lining is polypoid

In conclusion it may be said that the evidence appears to the examiner to favor an overgrowth of meso fat with torsion of the bowel, stagnation, infection, and stricture

It cannot be denied that the reverse may have occurred—infection of bowel, scarring, absorption of inflammatory products and hyperplasia of meso fat One or the other of these processes is obviously the cause of the obstruction and the fatal condition.

Spleen —The spleen weighs 125 Gm. It is softer than normal with insignificant small follicles

Pancreas —Normal

Adrenals —Not found.

Kidneys—Are equal in size and symmetrical. Their color is grayish and opaque and their capsules strip with great difficulty, leaving a very finely roughened surface. Surfaces formed by cutting are opaque and gray but markings may easily be identified. The cut edges do not evert.

Pelves and ureters normal.

Liver—Shows only cloudy swelling. The gallbladder is distended with thick semifluid tarry material.

Heart—Appears to have normal musculature, competent valves, and natural proportions.

Lungs—Are large and bulky and show marked acute congestion and stasis along the dependent parts.

Summary—The case would appear to be either one of lipoma of the mesentery of the sigmoid with mechanical derangement and secondary effects, such as chronic inflammation, congestion and stasis or a fat hyperplasia, secondary to some lesion of the sigmoid which is now obsolete. The gross evidence is so definitely against intrinsic lesions in the sigmoid that at time of autopsy the former diagnosis seemed the more likely.

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ABERRANT PANCREAS

More than 55 cases of aberrant pancreas have been reported. Some of their locations were as follows: stomach, pylorus, duodenum, jejunum, in intestinal diverticula, hepatic duct, omentum, and in region of umbilicus.

Embryology of the Pancreas.[1]—The pancreas arises from two entirely distinct entodermal outgrowths (dorsal and ventral pancreas). The dorsal pancreas grows out from the dorsal wall of the intestinal tube a little above the level of the common bile duct in man. The ventral pancreas grows down from the common bile duct at its junction with the intestinal tube. It grows to the right of the intestine and there meets the dorsal pancreas. The left lobe of the ventral pancreas sometimes grows around the left side of the intestine and joins the dorsal pancreas. This forms the anomaly known as the annular pancreas. As a rather frequent abnormality, accessory pancreases of small size, but sometimes of very typical structure are found along the intestine or even in the wall of the stomach, especially at the constriction around the cardiac and pyloric portions.

In the adult no histologic distinction has ever been found between the two pancreases, but although alike in structure and close together, there is no general anastomosis between them. Rarely they remain entirely separate. The dorsal is much larger than the ventral pancreas and it grows across the body toward the left until it reaches the spleen, thus giving rise to the body and tail and forming the ventral part of the head. Its duct (duct of Wirsung) opens into the duodenum after anastomosing with the duct from the ventral pancreas (accessory pancreatic duct of Santorini).

Moore,[2] in association with his report of a case of accessory pancreas in the jejunum, after describing seven different theories states that "the mode of origin of these congenital anomalies is either by adhesions of the main pancreatic anlage or from anomalous anlage." Also that "accessory pancreases are in rare

instances the underlying cause of diverticula and intussusception and the site of origin of carcinoma "

Wright,[3] in his report of an accessory pancreas found in the persistent omphalomesenteric remains in a fistula in the region of the umbilicus, states that "the pancreas is known to develop very early in fetal life in a region near that which afterward becomes the umbilicus" Biggs[4] described at autopsy a tumor at the pylorus, ovoid in shape, measuring 2 by $1\frac{1}{2}$ by $1\frac{1}{2}$ cm, grossly like a fibroma There were numerous ducts throughout the tissue but no well marked duct The specimen showed a partial separation of a portion of pancreatic tissue from the head of the gland by the muscular wall of the duodenum. He also states that pea-sized nodules of pancreatic tissue in the submucous layer of the intestine would probably be found at one third of all the autopsies In regard to the origin of the anomalies Biggs is of the opinion that there are three embryonal matrices for the pancreas, one dorsal and two ventral, and that one of the original diverticula fails to unite with the others, thus causing the anomaly. An aberrant pancreas has been found in a Meckel's diverticulum (H. Albrecht and Artz) [5]

Ruediger[6] describes five types of pancreatic anomalies:

1. The most common group including the numerous variations from normal of the excretory ducts.

2 Annular pancreas (surrounding the duodenum).

3 "Pancreas divisum." Partial separation of the head from the body, the two portions being connected only by the duct of Wirsung, caused embryologically by pressure of the mesenteric vessels

4 "Pancreas minus." Accessory pancreatic lobules springing from the head of the main gland and extending along the anterior wall of the duodenum.

5 "Pancreas accessorium." This is the type referred to in this discussion It was first described by Klob in 1859.

Boyden[7] describes the pancreatic bladder found in several animals, especially the cat, also an accessory pancreas associated with a pancreatic bladder with the duct emptying directly into the duodenum

The patient, J. C., age twenty years, single, entered New York Hospital August 5, 1929, on the First Surgical (Cornell Division, Service of Dr Charles L Gibson)

Chief Complaint.—Vomiting spells (eighteen months). Precordial pain

Present History.—During the past eighteen months patient has had vomiting spells, accompanied by pain over his heart, coming on two to three hours after eating and, at times, at night. Following the spell of vomiting the patient would have complete relief He would go for two or three months entirely free of trouble. Then the vomiting would recur with pain, as before The vomitus was never very acid in nature. Last attack was on August 5th, the day of admission. He has eaten very little recently because of fear of vomiting There has been no loss of weight, however He is not constipated. There has been no blood observed in his stools.

The pain is gnawing in character, generally over the precordium, but occasionally in the epigastrium. He feels somewhat weak and generally rundown

Family History.—Father alive and well

Mother alive and well. Had ulcer of stomach four years ago

Two sisters alive and well.

No history of carcinoma, tuberculosis, cardiorespiratory, nephritic, diabetic or asthmatic nature

Past History.—Childhood—measles

Medical—no history of pneumonia, pleurisy or diabetes

Surgical—negative.

Cardiorespiratory—negative, except precordial pain

Gastro-intestinal—negative, except as above

Genito-urinary—no pain, burning, hematuria, nocturia or frequency. Venereal denied

Physical Examination.—The patient is well developed and nourished, and weighs 115 pounds. He is not acutely ill. His skull and scalp are negative, his pupils are regular and equal, his tonsils scarred The neck is negative The lung examination shows the percussion note resonant, the breath sounds vesicular and no râles. The heart is not enlarged, its action is regular and no murmurs are heard. There is no tenderness of the abdomen It is not rigid and no organs or masses are felt. The reflexes are present. The genitalia are normal and the rectal examination is negative for abnormal findings No diagnosis made from the physical examination.

Examination in March, 1928, by Dr Sydney Weintraub, Chief of the Gastro-intestinal Department, Cornell Clinic revealed the following:

Physical Examination.—Eyes, nose, and throat negative Tonsils enlarged and cryptic. Heart and lungs negative Abdomen relaxed, no tenderness, no organs or masses palpable.

Fluoroscopic Examination—Heart, lungs, and esophagus negative. Stomach semitransverse, large size, atonic, low, superficial peristalsis, considerable spasm of the pylorus The cap is markedly defective

Three-hour examination showed almost a complete retention

Twenty-four-hour examination showed one third of the barium still remaining in the stomach The colon was poorly filled. The appendix was not visible.

Ewald Test Meal.—Twenty-five cc. total acid 19, free HCl 10, lactic present.

The findings were confirmed by x-ray plates.

Diagnosis.—Postpyloric ulcer with obstruction.

Repeated examination with the fluoroscope and x-ray revealed a similar condition.

Laboratory Findings.—The urinalysis was normal throughout. The blood count on August 5, 1929, was red corpuscles 6,750,000—110 per cent;

Fig. 178.—Accessory pancreas in the jejunum.

leukocytes 14,450, 86 per cent, lymphocytes 14 per cent. The Wassermann was negative. The blood pressure was 134/80, icteric index 11, blood urea 14 mgm. per 100 cc., blood sugar 138.

The patient vomited once before the operation.

Operation.—Gastro-enterostomy, appendectomy Findings. Large, indurated postpyloric ulcer Loop of jejunum with new growth—"adenoma"—

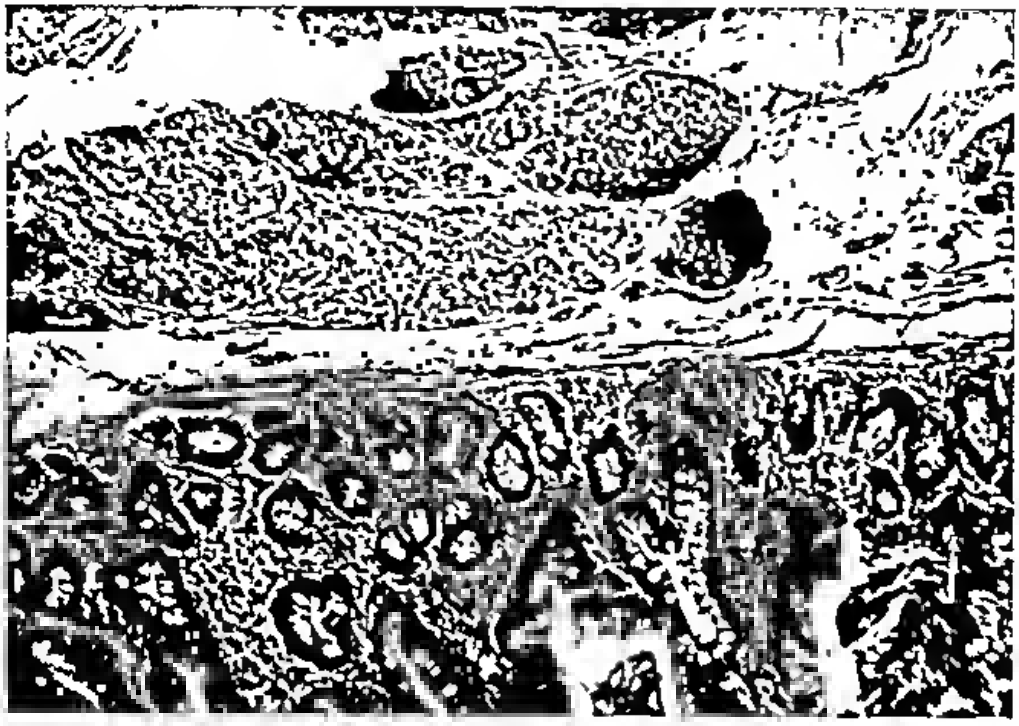

Fig 179.—Case II. Aberrant pancreas

Fig 180.—Case II Aberrant pancreas

1 x ½. This appeared to be nonmalignant Tumor was excised and opening used for a posterior gastro-enterostomy. Five layers of chromic catgut used

The appendix was removed and the stump inverted The blood pressure dropped to 70, rose again to 130, and fell to 80. (Spinal anesthesia)

Microscopical Examination.—Aberrant pancreatic tissue Sections microscopically through the specimen show an essentially normal jejunal mucosa Beneath this the submucosa and muscularis are found to contain a mass of physiologically normal appearing pancreatic tissue. This is seen practically embedded in the muscular wall of the jejunum and extends out into the surrounding tissues where similar islands of pancreatic tissue are seen It is accompanied by some slight increase of connective tissue and round-cell infiltration The ducts are well defined and lined by normal epithelium It appears entirely normal functionally

Postoperative Course.—The highest postoperative reaction was 100 6 F, pulse 120 The patient had the usual postoperative care and diet. On the eleventh day he vomited a large amount of undigested food, which was the first postoperative vomiting His weight on the fourteenth day postoperative was 113 pounds The wound healed by primary union and he was discharged improved, August 20, 1929 The diagnosis on discharge was ulcer of the duodenum, aberrant pancreatic tissue, and chronic appendicitis

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CLINIC OF DR. WILLIAM FRANCIS HONAN

DEPARTMENT OF TUBERCULOSIS, METROPOLITAN HOSPITAL (DIRECTOR OF SERVICE, DR. GEORGE G. ORNSTEIN; DIRECTOR OF SURGERY DR. WILLIAM FRANCIS HONAN)

SURGERY IN SELECTED TYPES OF PULMONARY TUBERCULOSIS

IT is proposed today to illustrate some surgical procedures that are performed on selected types of pulmonary tuberculosis. Experiences in thoracic surgery during the Great War stimulated to a great degree surgical interference in this disease. In the very beginning our enthusiasm possibly overran our judgment for it was a great temptation to attempt to do something for the patient surgically in whom the disease had become progressive and which had resisted all forms of expectant treatment. Later observations showed that there was a type of chronic tuberculosis in which nature attempted to cure by fibrosis, but by the very mechanism of the healing process complete fibrosis of lesions could not occur because of the operation of factors which were a part of the cure itself. For example· The fibrosis which tended to heal a lesion and contract a cavity would at the same time hold it open So methods then were employed which would permit collapse of the lung and not only allow cavities to fall together but reduce the circulation through the diseased lung and also diminish the toxic return flow through the veins and lymphatics to other parts of the same lung, to the contralateral lung or to other parts of the body.

The principal effect which we attempt to produce is to diminish the respiratory excursion of the lung itself and by interference with the circulation prevent as much as possible the further dissemination of tubercle bacilli. Artificial pneumothorax, could it be successfully performed in every patient,

would probably be the ideal procedure and little else would be required, but, due to adhesions between the lung and the chest wall, it is not always possible to secure a sufficient collapse to accomplish the purpose of complete rest of the diseased lung.

In the service at this hospital the patients are given bed rest, hygienic treatment, etc., and when it is determined that they are fit subjects for pneumothorax that procedure is performed. If the results are not satisfactory, surgical intervention is then considered and of these phrenico-exairesis is the first procedure. This operation, which has for its object the performance of a hemidiaphragmatic paralysis, allows the diaphragm to rise at a higher level and modify the negative interthoracic pressure and restrict the pumplike action of the diaphragm which is one of the factors in forcing the blood back to the heart. This procedure is comparatively simple and without great danger. It almost invariably causes some improvement in the pathologic picture, and particularly does it indicate the reaction of the patient and so becomes a valuable index of his resistance to probable future operations of a much more serious type. We will illustrate this upon a patient with the following history:

Case I.—C. G., female, aged twenty-nine years. Admitted to the hospital April 25, 1929. Chief complaint: occasional cough and weakness.

About six months ago contracted a cough which was accompanied by night sweats, chills, and fever. About four months ago she states that she developed pneumonia of the left side. She was extremely ill and confined to bed with severe weakness, hemoptysis, chills, fever, and sweats. She lost 7 pounds during this acute illness. She has had repeated attacks of hemoptysis during the illness and since her recovery from the acute condition. Sputum examined at this time was found negative for tubercular bacilli.

It seemed to be the opinion that this patient had a bronchial pneumonic infection of the left lower lobe. x-Ray examination showed involvement of the left lower lobe and an annular shadow the size of a twenty-five-cent piece at the left root area. Two consecutive sputum examinations at the hospital were positive for tubercle bacilli, which confirmed the diagnosis of tuberculous pneumonia of the left lower lobe.

One month of bed rest showed no pathology in the right lung and some clearing in the left, but an increase in the annular shadow of the left root which was now about the size of a fifty-cent piece. Cough had considerably decreased, temperature ranging between 97 and 100 F. Patient continued to improve, showing marked decrease in cough and expectoration, and temperature remaining flat from July 1st to the date of her discharge, August 24.

1929 During this time she had gained 16 pounds in weight. The patient was discharged against the advice of the resident physician

Patient readmitted after prolonged stay at home *x*-Ray on admission showed large annular shadow still present in the left root area with a definite fluid level and with an infiltrative process extending throughout the major part of the left lower lobe. Some extension into the right peripheral lung field. She has now been in the hospital one week and we propose a left phrenico-exairesis

The patient had the usual preliminary narcosis of ¼ of morphine and 1/150 atropine sulphate. The skin of the neck was cleansed with ether and the entire neck on both sides painted with a 3 per cent solution of picric acid. Patient's head is inclined to the right side and a point corresponding to the

Fig. 181.—Showing large cavity in case of C. G before phrenico-exairesis was performed

posterior edge of the stenocleidomastoid about a thumb's breadth above the clavicle is infiltrated by a fine needle with ½ of 1 per cent of a solution of novocaine. This infiltration is carried about 1½ inches externally and parallel to the clavicle Deep infiltration is also made with due regard to the circulation in the lower depth of the wound. With a small sharp scalpel an incision is made through the skin and the platysma down to the deep fascia of the neck when we will again infiltrate with the novocaine solution still deeper. After the division of the deep fascia a cone-shaped layer of fat will project into the wound. This is opened and the scalenus anticus muscle should be in the

bottom of the incision For retraction of the wound we employ small retractors such as were devised by Dr Crile, for ligature of the superior thyroid in goiter operations The retractor to the inside must be carefully held because it is against the internal jugular vein and, as Alexander has pointed out, this partially collapsed vein may give the appearance of fascia and inadvertently be opened As I insert my finger in this small opening I can feel the belly of the scalenus anticus muscle and the transverse processes of the cervical vertebrae By using a small gauze wipe the muscle is cleared and shining through a thin fascia covering the phrenic nerve, arising from the third, fourth, and fifth cervical roots, may be seen passing slightly obliquely across the long axis of the muscle With the blunt scissors it is freed, lifted up with a blunt hook a few drops of novocaine solution injected into it

Fig 182 —Showing progressive healing of cavity three and a half months after phrenico-exairesis

proximally, a Kocher clamp is applied, the nerve sectioned and carefully and slowly wound upon the forceps Occasionally we pass it through a small Mayo vein stripper in order to break up some adhesions and to tear off any accessory branches It is of the greatest importance to remove this nerve in its entirety and to be sure that an accessory phrenic, which occasionally occurs, shall be removed as well You will notice that as I very slowly turn the forceps the nerve winds around it like thread on a bobbin This particular nerve is of good size and seems to be strong, sometimes they seem to have undergone some form of degeneration which we have not as yet determined, and break off before we have avulsed the nerve in its entirety

The patient now gives the first evidence of distress, and she refers to the deep thorax and the cardiac area This nerve, while almost entirely motor, does send a few branches to the pleura and also to the pericardium It is common experience that if the process of avulsion was very slowly and carefully made, all things being equal, a greater amount of nerve may be removed. The patient now is at the peak of her distress and by that symptom I know that soon the nerve will break off and, as you see, it breaks abruptly and at the distal end are several small fibrils We have a little over 12 inches which, I think, is extremely satisfactory There is a very slight oozing of blood from the depth of the wound which will promptly cease We pour ½ ounce of ether into the wound, put in a few interrupted sutures in the fascial layers and close with triple naught, plain catgut, intradermal sutures tying the loose ends over a small gauze wipe. We place another gauze dressing above this and the operation is completed The patient has not now any distress and I prophecy for this a splendid result in the elevation and immobilization of the corresponding half of the diaphragm We have performed this operation thirty three times with one death

Dr. Samuel A. Jacobson, Resident Physician, will present the postoperative results of the series:

Dr. Jacobson: Of the first 23 cases, 1 case had a bilateral operation at an interval of a month. The ages ranged from seventeen to fifty-eight years. Duration of illness obtained from the histories was from two months to eleven and a half years. Seventy per cent of the cases had bilateral involvement, and 30 per cent had unilateral involvement. There were eleven phrenic neurectomies, and twelve on the right side. Effects of the operation on the patient's temperature readings were as follows: 3 cases with flat temperature before operation remained so after operation; 7 cases with flat preoperative temperature had postoperative readings ranging from 99.8 to 102 F. The duration of this rise in temperature was from two to ten days. Six cases that had been running septic temperatures became flat in from eighteen days to five weeks postoperatively. Six cases running septic temperatures before operation remained persistently septic postoperatively. Seventy-five per cent of the cases had a noticeable decrease in cough and expectoration following the phrenicoexairesis.

The sputum of all the cases was positive for tubercle bacilli before operation and remained so up to a period of five weeks postoperatively. Eight cases that were discharged from the

hospital were discharged as clinically improved. Seventy-five per cent gained weight after the operation and the remaining 25 per cent remained at stationary weight. Of the 10 cases remaining in the hospital at the present time all have clinically improved, as regards cough and expectoration and general physical condition. Some show a clearing of the pathology; some show evidences of fibrosis, and in others diminution in the size of the annular shadows both on the operated and the contralateral sides Of the five deaths in this series the time elapsing between the operation and their passing ranged from two to fifteen months

Two cases of the series have hemoptysis postoperatively, two and nine days respectively There was no history of hemoptysis in these cases previous to operation They were both of the caseous pneumonic type and it is difficult to see how the phrenico-exairesis was a contributing cause, since this type of pathology is in itself a cause of blood vessel erosion with consequent hemoptysis One case developed a pleural effusion on the opposite side three weeks postoperatively, but with subsequent absorption and complete recovery from that complication. Two cases had some gastric symptoms, *i e*, vomiting and belching, with some hiccough, postoperative to a left-sided operation In no case of the entire series was there any postoperative infection of the wound, all incisions healing per primum.

A résumé of ten additional phrenico-exaireses showed almost similar statistics This series contains the one fatality which was a five months' pregnant woman with a basal tuberculosis, complicated with asthma Seventy per cent had a bilateral involvement, and 30 per cent unilateral involvement. The cases that had a flat temperature before operation remained so postoperatively, except one which, one month later, developed a pleural effusion on the opposite side Eighty per cent of the cases had decreasing cough and expectoration and sputum. All cases that were positive before operation remained so at the time of this report Of the nine patients of this series, which are still in the hospital, 80 per cent had retained a stationary weight, one lost 3 pounds after the operation The common complaint

of patients in this series was occasional pain in the shoulder and sometimes transient gastric disturbances with abdominal distension, particularly when the operation was performed on the left side There were no other complicating conditions noted. There was no spread of the pulmonary lesion and no postoperative infections of the wound.

Postoperative Notes on Case of C. G.—No immediate ill effects of the operation. Postoperative course uneventful. Temperature range normal. Cough and expectoration scant. Physical and *x*-ray examination of the patient one month after operation showed left diaphragm high, signs of compression of the left lower lobe with some suggestion of bronchial breathing There was marked diminution in the size of the cavity of the left root area which had contracted to the size of a ten-cent piece, with evidence of fibrosis around it.

The pathology in the right lung had cleared somewhat. The patient remained in the hospital until November 7th and then demanded her discharge, promising to return for further examination.

Six weeks after her discharge from the hospital, which was three and a half months after the phrenico-exairesis, showed the diaphragm to be about the level of the seventh rib, and also practically a complete obliteration of the cavity in the left root area. Pathology in the right lung had cleared considerably

Comment.—Phrenico-exairesis is a safe and effective procedure as a factor in the surgical treatment of pulmonary tuberculosis It is of great value especially in those cases not suitable for pneumothorax from the start, or for cases that have shown unfavorable results from pneumothorax, either because of the difficulty in entering the pleural cavity or from other difficulties which may arise during the course of treatment with pneumothorax. It should invariably he employed as a preliminary procedure before performing thoracoplasty or multiple intercostal neurectomy

It is of great importance as a preliminary operation in those cases having mostly unilateral lesions with some small extension to the opposite side that have been under consideration for thora-

coplasty or multiple intercostal neurectomy. This procedure enables us to see if the partially involved lung will show increase in its pathology Depending on this fact further operative procedures may or may not be done Phrenico-exairesis is valuable in replacing pneumothorax treatment of caseous pneumonic lesions of a chronic nature

The double phrenico-exairesis spoken of in this series was discharged from this hospital as clinically improved The second stage of the operation was performed at an interval of about one month from the first The rise of the right diaphragm from the first operation was very good After the second operation on the left side there was no evidence of diaphragmatic rising, this may have been due to the complicating emphysema at the base of the left lung

It will also be noted that it is a procedure of relative safety to the patient and does not involve any serious postoperative complications and occasionally, as in the case reported, is capable of producing a sufficient compression to effect the almost complete healing of a large cavity in a relatively short time

In the consideration of the results of pulmonary surgery, it must be borne in mind very definitely that it is not intended in any way to supplant the now well understood methods of the expert phthisiologist, but that a varying percentage (10 to 15 per cent, according to various observers) may require surgical interference but only upon the selection and recommendation of the expert internist

Case II. Spinal Anesthesia in Pulmonary Surgery.—Many cases of pulmonary tuberculosis, which undoubtedly will die under the expectant treatment of bed rest and hygienic treatment are not in condition successfully to undergo radical surgery, namely, thoracoplasty. As the late Dr William S. Halsted was accustomed to say, in connection with hyperthyroidism, "All methods of treatment are but preliminary to a double lobectomy of the thyroid gland."

So in pulmonary surgery all surgical procedures must be for the purpose of preparing the patient, as a rule, for a final thoraco-

plasty. Unfortunately this is a very difficult task for, basically, in order that the patient may not only survive, but be benefited by that form of compression, the case must be of the chronic, fibrotic character, and there must be a fairly good contralateral lung in which there is little patbology or whatever there has been is in a quiescent or arrested state. It is not an extremely difficult matter to perform a graded thoracoplasty, even upon a rather severe involvement of tuberculosis of the lungs without an excessive operative mortality. And still the patient who recovers from the operation may succumb in a comparatively short time having derived no real benefit from the surgical procedure.

In this clinic in order to give the patient the best possible chance we have tried almost every form of known anesthesia with varying results. Gwathmey's ether-oil anesthesia, which, incidently, was largely developed by him in this Institution, possessed many advantages except that we believe ether to be a detrimental factor in pulmonary tuberculosis, no matter bow it reaches the circulation. Avertin, of which we claim prior use in this country, had also many advantages, but it is impossible oftentimes to get complete anesthesia, particularly in males. We have been fairly fortunate in its use in females for operation in general surgery, but it produces a cyanosis which we did not feel made it safe or efficient in patients with pulmonary tuberculosis. Paravertebral local anesthesia with neocaine is fairly satisfactory, except that it is not always possible to get perfect analgesia. These patients must be sufficiently anesthetized if their cooperation is to he obtained, because they almost of necessity are obliged to undergo a series of operations They seem to be hypersensitive, imaginative and suspicious—a mental attitude always noticeable in patients who have undergone long periods of hospitalization.

For years we have attempted to find a substitute for inhalation anesthesia and with varying success. We had great hopes at one time of finding a successful agent to produce anesthesia by the intravenous route and, after various experiments with about ten respiratory sedatives in some 500 cases, we abandoned the project for local, regional, and spinal anesthesia.

In the operations which we performed in general surgery under spinal anesthesia, we noticed a higher level of anesthesia depending upon the amount of dilution with the spinal fluid. By gradually increasing the dilution, the height of that area was so increased that we found we were able to obtain a sufficient anesthesia to remove the first rib. Eventually all of our operations on the chest were done by this method. We were unaware of the excellent work of Koster, in Brooklyn, along these lines, who undoubtedly had preceded us in the extension of this method for all operations in surgery

My associate, Dr. Samuel Alcott Thompson, has carefully worked out this procedure and I will ask him to explain his method in detail

DR THOMPSON: Spinal anesthesia should be considered as a procedure and not a drug Its success depending upon the management of the patient before, during, and after the operation. The night before the operation a sedative should be given, such as luminal, veronal or medinal to insure the patient a night of restful sleep On the day of the operation preliminary narcosis should be given, morphine preferably, the dose depending upon the weight of the patient A full dose may act too decidedly as a respiratory sedative, a condition which would be embarrassing in this high type of anesthesia Before the patient is brought into the operating theater, all preliminaries that suggest noise, particularly of a loud or disturbing nature, should be eliminated as they produce a bad psychic effect upon the patient.

Small pledgets of cotton are placed in the patient's ears and a cotton ball over each eye, held in place by a narrow strip of adhesive plaster extending from temple to temple The patient is placed upon the operating table on one side with the knees and the head drawn toward the chest, the shoulders in a line perpendicular to the table After preparation of the skin a needle is introduced, never higher than the second lumbar interspace Higher than this might injure the solid part of the cord. A few drops of 1 per cent novocaine solution containing $\frac{3}{4}$ grain of ephedrin is injected into and beneath the skin The needle is introduced and 8 cc of spinal fluid withdrawn Depending

upon the weight of the patient from 250 to 300 mg. of novocaine crystals are dissolved in this fluid, which is slowly reinjected into the subdural space. No additional spinal fluid is allowed to escape and no further mixing of the solution by drawing the piston of the syringe back and forth is necessary. The needle is withdrawn and the patient is immediately placed in the proper position for operation, with the addition of a rather marked Trendelenburg posture. This volume of spinal fluid and the indicated dose of novocaine will give a complete anesthesia up to the face and usually of the entire body The respiration will become slightly embarrassed and the patient should be encouraged to breathe slowly and deeply. As the anesthesia is almost immediate the operation may begin as soon as the operative field is prepared and the anesthesia will last from fifty to seventy minutes. It is important to maintain the patient in the Trendelenburg position during the entire operation, while being lifted to the stretcher and while being transported to the room or ward. The foot of the bed should be slightly elevated for at least twelve hours. At no time should the patient's head be suddenly lifted, as this may produce an acute cerebellar and medullary anemia resulting in respiratory depression or cessation. Should the breathing become embarrassed a few moments of artificial respiration with increased Trendelenburg position is usually sufficient to start respiratory effort again.

Since the cardiovascular system is at rest during spinal anesthesia little or no attention is paid to the peripheral blood vessels and no stimulant is given for the purpose of raising the blood pressure. Respiratory failure is the chief and almost only danger of spinal anesthesia and is not due to any effect of the novocaine upon the respiratory center in the medulla or as the result of phrenic nerve block, with paralysis of the corresponding half of the diaphragm. Cerebral anemia can be effectively prevented and overcome by the early and continuous use of the Trendelenburg position

DR. HONAN: On May 29, 1929, at the Meeting of the National Tuberculosis Association, at Atlantic City, N. J, Dr. John Alexander, University of Michigan Hospital, Ann Arbor,

Michigan, presented a paper with a report of 6 cases of multiple intercostal neurectomy for pulmonary tuberculosis He was led to perform this operation after a series of animal experiments, noting the effect of the combined resection of the phrenic and intercostal nerves on one side of the body, and was astonished at the almost total immobility of that side of the chest and the marked falling in of the ribs overlying the lungs. The results in these reported cases were sufficient to engage our interest in those cases in which thoracoplasty was contraindicated by the pathologic condition in the patient's lungs, and their inability to reap the good effects from such serious surgical procedure.

Through the courtesy of Dr Alexander, who gave us an opportunity to read his paper before publication, we were able to follow his technic in one operation, and we present the second case on whom we will attempt the same procedure. We performed this operation in one case in which we believe the results are such as justify the continuance of its employment and we now present another patient for the same procedure

Patient E W, aged thirty-one years, was admitted to the Metropolitan Hospital on January 30, 1929 The essential points of the history, as given by Dr Jacobson, show the usual symptoms of cough and are as follows Expectoration, general weakness, night sweats, pain in the left chest The patient has never had any hemoptysis

Routine examination revealed that he had a plus four Wassermann reaction He has been on an intensive course of treatment and at present the Wassermann reaction is plus two The pulmonary findings were essentially those of a massive caseous pneumonic process of the left lung with some atelectasis and a good deal of cavitation The right lung is partly involved, mostly in the upper lobe The pulmonary pathology on the right side is deeply seated, which make the physical findings scanty.

At a surgical conference on October 4, 1929, it was suggested that a phrenico-exairesis be done on the left side to test the power of the right lung to resist further tuberculous infection This operation was done on September 9, 1929 with an idea of performing a thoracoplasty at some future date should the patient show decided improvement The postoperative course following the phrenico-exairesis was unimportant

On November 22d the following observation was made. There were no breath sounds below the eighth vertebral spine on the left side. The result of the phrenico-exairesis was excellent; the patient has done fairly well since operation and expresses himself as feeling better. There has been no further extension of the pulmonary pathology On account of the pathology in the right lung he is not considered a suitable case for thoracoplasty, but probably

would come more within the scope of multiple intercostal neurectomy or the Alexander operation

You will observe the technic employed by Dr. Thompson in the induction of spinal anesthesia The patient is placed upon the operating table practically lying on the abdomen with the side uppermost upon which we propose to operate The arm is placed well forward, which widens the distance between the vertebral border of the scapula and the spinous process A straight incision is made to the angles of the ribs from the second to the twelfth inclusive. Beginning at the fifth interspace externally the intercostal muscle is divided for a distance of about 3 cm half way between the ribs, with the incision centered at the angle of the ribs All forceps are removed, all bleeding points are ligated with very fine catgut The muscles are closed in layers, a small drain is inserted and the skin approximated with large sized Michel clips

On account of the paralysis of the muscles supplied by the intercostal nerves, our principal difficulty will be to encourage this patient to cough sufficiently to raise sputum. This condition is best counteracted by having the patient lie most of the time upon the operated side The patient as you will notice is in good condition and has not felt any special inconvenience except when we inserted the last two to three Michel clips Patient and nurses must be warned that there is an area of anesthesia which usually extends from the area of excision to about the midaxillary line with a patch of anesthesia on the anterior-posterior surface of the chest extending from the fifth sternocostal articulation to the midaxillary line This last observation was made in the case of a previous patient upon whom we performed the same operation The patient being without sensation in this region could be easily burned or traumatized without his knowledge.

Postoperative Note—With the exception of a barbital hypnotic (which was administered for postoperative distress) morphine was not administered because it predisposes the retention of pulmonary secretions By the third day this patient was coughing only slightly and was able to raise expectoration without difficulty. During his fourteen days' retention in the surgical ward his temperature varied between 98 and 100 F His pulse was 90 to 120, respiration 20 to 35 On the fourteenth day he was returned to the tuberculosis division

March 26, 1930 Patient has gained weight, flat temperature, very little cough with but trifling expectoration, appetite excellent, *x*-ray plates do not show *much betterment in lung pathology, but patient shows clinical* betterment, line of anesthesia disappearing

Subsequent Comment at Surgical Conference with Exhibition of Both Patients.—In the two patients upon whom this operation was performed, one on October 29, 1929 and the other on December 6, 1929, it was noted in the first case that, while there was not a decided change in the pathology of the lung both patients showed improvement.

In one case the postoperative course was unusually smooth with lessened cough and general well-being. And while the time is too short to state definitely, it is the concensus of opinion of the staff that both these cases have been benefited to an extent and that if the improvement continues they will be in excellent condition for a graduated thoracoplasty

As no rib is divided, cases of this kind retain the protective rigidity of the thoracic wall and the patient is protected from the two chief dangers of thoracoplasty, *i. e.*, cardiocirculatory failure and rapid extension of the tuberculous lesion. Further, since operative mortality should be very much less in multiple intercostal neurectomy than in thoracoplasty it may be used in a rather large group of patients who are not suitable subjects for thoracoplasty and in whom pneumothorax has proved inadequate.

We welcome this procedure which, with the preliminary phrenico-exairesis, is an additional measure to prepare a patient for the most serious thoracoplasty which is sure to follow in these two patients, should improvement of their condition warrant its employment

Dr. Alexander has called attention to the fact that the external intercostal muscles run downward and forward, and the internal run backward and downward. Great care must be taken not to wound the parietal pleura which lies just beyond the intercostal nerve and thus is posterior to the angle of the rib There is a distinct layer of fascia called "the posterior intercostal membrane," posterior to the angle of the ribs, and the "fascial layer between the intercostal muscles" anterior to the angle of the ribs, which lies just beyond the external intercostal muscle Immediately beyond the fascia are the intercostal nerve and vessels which lie in an incomplete sheath of the fascia Just beyond the nerve and vessels, posterior to the angle of the ribs, is the narrow layer of areola tissue called the *endothoracic fascia* and beyond this is the parietal pleura Because of the nearness of the pleura to the nerve posterior to the angle of the rib it is preferable first to seek the nerve anterior to the angle of the rib where the internal intercostal muscle is

interposed between the nerve and the pleura. In other words, the internal intercostal muscles ordinarily do not exist further posteriorly than the costal angle.

Taking the angle of the rib in the fifth interspace as a center we make an incision through the external and intercostal muscles down and with slight blunt dissection expose the nerve This is drawn up with a curved forceps and about $1\frac{1}{2}$ inches resected. Dr. Alexander has pointed out that no advantage is obtained by avulsing the nerve to any great extent. This same procedure with the aid of small retractors is performed in each of the intercostal spaces and, as you see, in this case there is a great thickening of the pleura, with some involvement of the intercostal muscles and structural changes around the angles of the ribs. This makes the operation slightly more difficult than in our previous case but we have now completed the operation.

Case III. Resection of the Superior Laryngeal Nerve for Advanced Tuberculosis of the Larynx.—The patient who will be presented has not only an extensive tuberculous involvement of both lungs, but also has such an extensive ulceration of the larynx that at the present time he is unable to swallow even a teaspoonful of water His case is as emergent as almost any surgical crisis, and his condition is agonizing in the extreme He has been in the hospital about two days and all methods to give him relief have failed He has lost 12 pounds in weight in one week Sometime ago in anticipation of such an emergency we made a study of the sensory nerve distribution of the larynx and decided that resection of the internal branch of the superior laryngeal nerve on both sides would in all probability give symptomatic relief. At that time we could not find anything in the literature of general surgery that would supply a technic, being ignorant of the excellent work of Dr. Henry P Schugt of this city, who had published an article in the Archives of Otolaryngology (December, 1926, vol 4, pp 479–488).

The usual deplorable works on anatomy gave rather vague description of the distributions of the branches of this nerve, but in a case similar to the one we will show you today we were obliged to evolve a technic overnight to meet the exigencies of a similar emergent case.

The patient being placed in the gotter position, and the skin prepared in the usual way, ether followed by picric acid, 3 per cent alcoholic solution applied on an area corresponding to space between the lateral aspects of the cornu of the hyoid bone and the thyroid cartilage, a skin incision is now made in the interval between the hyoid bone and the superior margin of the thyroid cartilage to the sternocleidomastoid muscles. The smaller muscles are disposed medially and under careful and deep dissection the superior laryngeal may be found running downward, forward, and to the mesial line to pierce the

thyrohyoid membrane to be distributed to the mucous membrane of the interior of the larynx and epiglottis The nerve is now resected with the accompanying artery and vein

The right side has been fairly easy and we shall hope to have the same good fortune on the left side. We shall pursue the same technic and, as you see, my object is to keep in a space that is roughly parallel with the superior

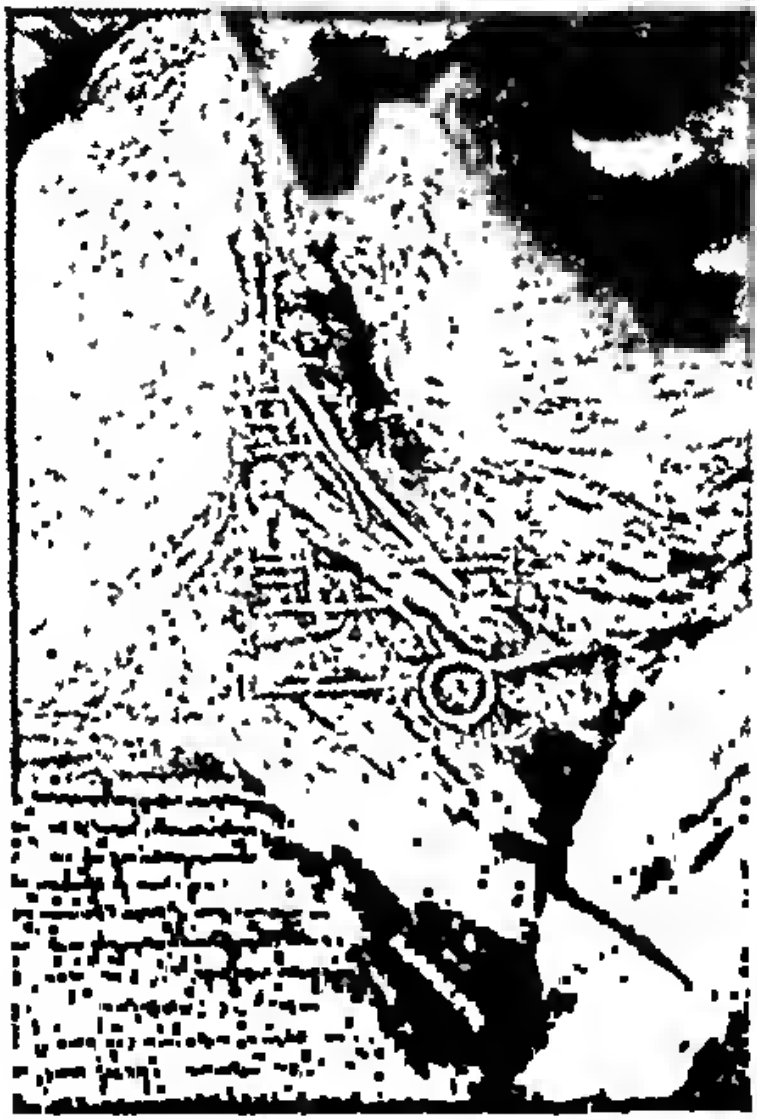


Fig 183 —Deep dissection showing the ganglion nodosum, with the superior laryngeal nerve coming off, and its division into internal and external branches also the artery accompanying the internal branch

border of the thyroid cartilage and quite near the ala of the corresponding side, and endeavor to find a nerve that comes forward and downward and to the middle line from under the external and internal carotid arteries It is situated rather deeply in the side of the neck on the middle and inferior constrictors of the pharynx We have now demonstrated the left branch and it is resected as before The wound is closed with horse hair and a simple gauze dressing applied As you have noticed, the patient has experienced

very little distress from the operation and we shall anticipate, judging from the results in a former case, that he will be able to swallow without pain or difficulty.

Postoperative Notes—Patient suffered from some wound pain but took liquids the first day, semisolids on the fourth day, and in one week was on

Fig. 184.—Dissection showing the sternocleidomastoideus raised from its origin, showing the internal jugular vein, the carotid arteries (internal and external branches), superior thyroid, lingual and external maxillary branches of the external branch The vagus nerve and the external branch of the superior laryngeal nerve descending to its termination This also shows the relation of the artery and vein to the internal branch of the latter nerve

the usual diet prescribed for tuberculous cases He survived for about three months to finally succumb from the major disease, but at no time did he experience any pain or difficulty in swallowing This operation is only offered as a humane procedure, for those patients who, becoming emergent, reach the hospital in a deplorable condition of dysphagia with its consequent inanition and dehydration

Since this operation Mr. Coblentz, a student at Flower Hospital and Medical College, under the direction of Professor Conrad Tharaldsen, made some special dissections of the superior laryngeal nerve and the distributions of its branches, a description of which is herewith appended

Internal Laryngeal Branch of the Superior Laryngeal Nerve.—The internal laryngeal nerve passes downward and forward with a slight inward direction from its origin from the superior laryngeal of the vagus, passing inward to enter the larynx between the constrictor pharyngeus inferior and the constrictor pharyngeus medius, by piercing the thyrohyoid membrane, accompanied by the corresponding artery and vein. In its course, from its origin to its termination, it is in the following relations:

Commencing at the superior cornu of the hyoid bone, it passes downward to the upper border of the thyroid cartilage, passing in this position under cover of the thyrohyoid muscle to the thyrohyoid membrane, which it pierces to reach the interior of the pharynx Reaching the lateral wall of the sinus piriformis, it divides into several branches, which may be divided into epiglottis, pharyngeal, descending and communicating, which go to supply the mucous membrane of the pharyngeal portions of the larynx and the mucous membrane of the base of the tongue. The epiglottis or ascending branches supply the epiglottis, being found on the mucous membrane of both surfaces of the epiglottis, a branch from this portion supplies the base of the tongue, by means of a fine filament. The descending branches are found throughout the mucous membrane lining the larynx, and inner surface of the cricoid cartilage, also sending an anastomotic branch to the terminal of the inferior laryngeal nerve

The terminal branches of the internal laryngeal also send fine filaments to, and receive a few sensory fibers from the terminal branch of the external laryngeal nerve in the region of the cricothyroid membrane

External Branch of the Superior Laryngeal Nerve.—This begins as a bifurcation of the superior laryngeal nerve 1 cm. below the origin of the superiolaryngeal nerve, behind and medial to

the internal carotid artery. It descends vertically, and in this position communicates with the internal branch Here it rests upon the constrictor pharyngeus inferior, under cover of the internal carotid artery. It then curves forward, emerging at the level of the origin of the lingual branch of the carotid (internal). In its course forward it passes from the posterior-superior border of the thyroid cartilage to about the middle of the lower branch of the thyroid cartilage, where it divides into two branches which curve forward. One branch pierces the thyropharyngeus and becomes lost in the cricothyroideus, the posterior branch of the division passing into the substance of the capsule of the thyroid gland near the upper border of the cricoid cartilage.

In its course downward the external laryngeal nerve gives off several fine filaments to the constrictor pharyngeus inferior and a communicating branch to the superior cardiac nerve. The latter is given off behind the common carotid artery.

The terminal branches of the external branch of the superior laryngeal nerve may be located in the angle formed by the superior belly of the omohyoid and the sternohyoideus muscles.

CLINIC OF DR. THOMAS H. RUSSELL

NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL

INGUINAL HERNIA

INGUINAL hernia has been the subject of much discussion during the past fifteen years because of its importance from a medicolegal standpoint. In spite of all the controversy there appears to be need for more thorough understanding on the part of a great many medical men, of lawyers who undertake to examine claimants and who try cases before Commissioners under the Workmen's Compensation Act of the different states, and of the layman.

The failure to understand herniae is due to several factors.

1. The word "rupture" is a misnomer and should practically never be applied to inguinal hernia. I have never seen a case in which the term could be applied. Rupture means a violent tearing or separation of muscles with a forcible expulsion of some part of the abdominal contents into the hernial sac which might be caused by an accident such as having the trunk of the body caught between an elevator and some part of the shaft, or when a horse rears and falls backward, forcing the pommel of the saddle into the abdomen of the rider.

2. It is still believed by many that a hernia appears immediately or is recognized as such a day or two after the accident.

As an example take a laborer lifting the heavy end of a beam. He misses step, or his fellow laborer lets go of the other end—the man instantly feels a pain in the region of the groin. He may be momentarily disabled and capable of resuming work after a short rest. The next day examination by a physician reveals nothing but slight tenderness about the internal or external inguinal ring. The patient is assured that no hernia is

present and advised to return to his job The patient is not examined again until perhaps six months later when owing to a similar accident he feels a recurrence of the pain At this examination a mass can be palpated in the groin and the patient is informed that he has a hernia presumably due to the strain sustained in the last accident An operation is performed and paid for by the insurance company with whom the patient was insured when the last accident occurred No one realized that *the hernia was due to the first accident at which time the patient* was probably insured by another company

3 Failure on the part of the layman to appreciate that in many males the peritoneum which is forced down into the scrotum during the descent of the testicle in utero never becomes completely obliterated, leaving a sac through which an abdominal viscus may be forced many years later, producing a hernia

For instance a gardener may push a lawn mower for many years, all the time being conscious of some very slight discomfort in the groin Suddenly he notices a bulging mass in the groin or his attention is called to it by a doctor during a physical examination There is no history of trauma nor injury, yet this is an occupational hernia and is just as compensatory as many others in which compensation is allowed

Unfortunately the laws of the different states have not been changed to cover the various types of herniae and until they are, confusion will exist and unjust claims running into thousands of dollars each year will be paid, and in many instances just *claims ignored*

The one redeeming feature of the law today is the "aggravation clause" though even this works, at times, very unfairly because frequently a decision is rendered in favor of the claimant because of the aggravation to a preexisting hernia, thus giving the claimant just as much compensation as would be allowed to one who has a true occupational hernia The position of Commissioner in a Labor Bureau is a most responsible one and requires a clear conception of the formation of the various types of herniae in order that fair decisions may be rendered.

For practical purposes a simple classification of inguinal hernia is all that is necessary to insure a fair understanding of the condition.

That is: (*a*) Indirect hernia.
(*b*) Direct hernia.

INDIRECT INGUINAL HERNIA

Indirect hernia is much more frequent than direct hernia. All congenital herniae, *i. e.*, those in which the testicle is contained in the sac, are INdirect. The radical cure for indirect hernia is simple as compared to the cure of direct hernia for in the former a great many cases are cured by simple ligation and excision of the sac.

Most direct herniae are acquired. They are easily differentiated from indirect herniae because in indirect hernia the sac passes downward and inward in the inguinal canal whereas in the direct hernia the sac emerges close to the outer edge of the rectus muscle. This difference enables one readily to distinguish between the two. The neck of the sac in the direct is much larger than in the indirect variety The coverings are different, which should be borne in mind when exposing the sac and in order to make a satisfactory repair. Far too little attention has been paid to the use of the transversalis fascia in the repair of hernia, especially of the direct type This structure is the first muscular covering of the peritoneum and is as essential to the success of a hernia operation as the careful suturing of the same muscle when closing a gallbladder incision The transversalis muscle always reminds me of the first defense trenches in warfare. It is the careful preservation and proper closure of this muscle with the reinforcement afforded by suturing the edge of the rectus muscle to Poupart's ligament which I depend upon to insure a good result in the repair of all direct herniae.

During the past ten years I have used an operation which is a slight modification of the Bassini operation for inguinal hernia.

A cathartic is administered on the night before the day of entering the hospital. On the day of admission the pubes is shaved and the patient instructed to take a tub bath. No

cathartic is given on the night before the operation. Another tub bath is given on the morning of the operation. One hour before time of the operation $\frac{1}{6}$ grain of morphine is given by hypodermic. Spinal anesthesia, using either neocaine or spinocaine, is administered and the lower abdomen, upper thighs, and genitalia are painted with half-strength tincture of iodine. An

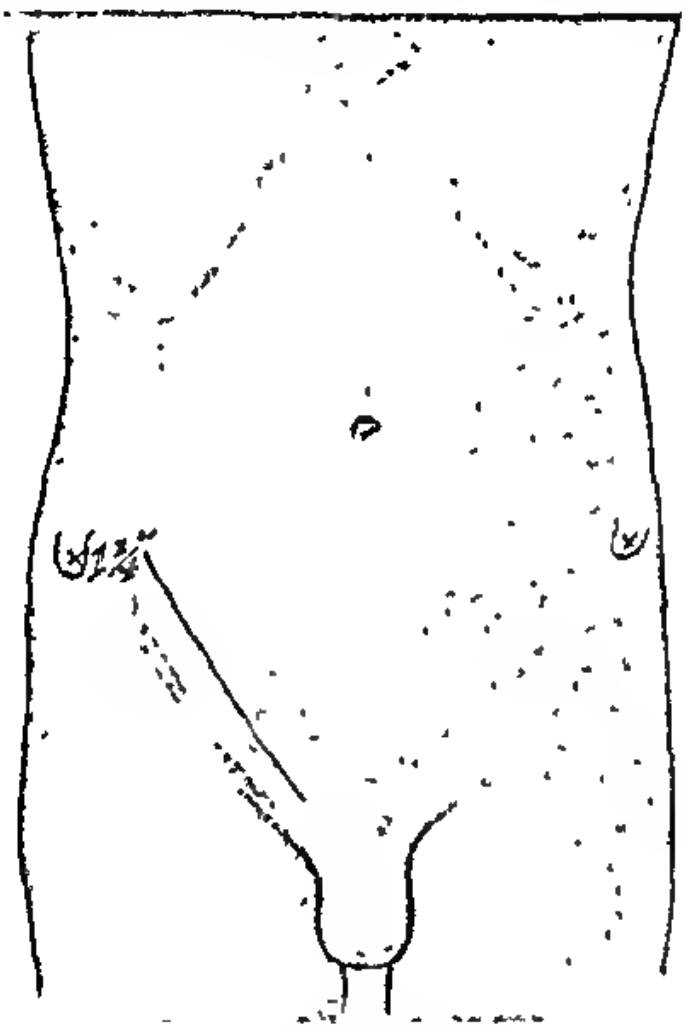


Fig 185.—Line of skin incision.

incision about 4 inches long is made extending from a point about $1\frac{1}{4}$ inches to the inner side of the anterior-superior spine of the ilium downward parallel to the fibers of the external oblique muscle to just below the middle of the external abdominal ring (Fig 185)

The outer flap of the skin and subcutaneous tissue are dissected from the aponeurosis of the external oblique muscle

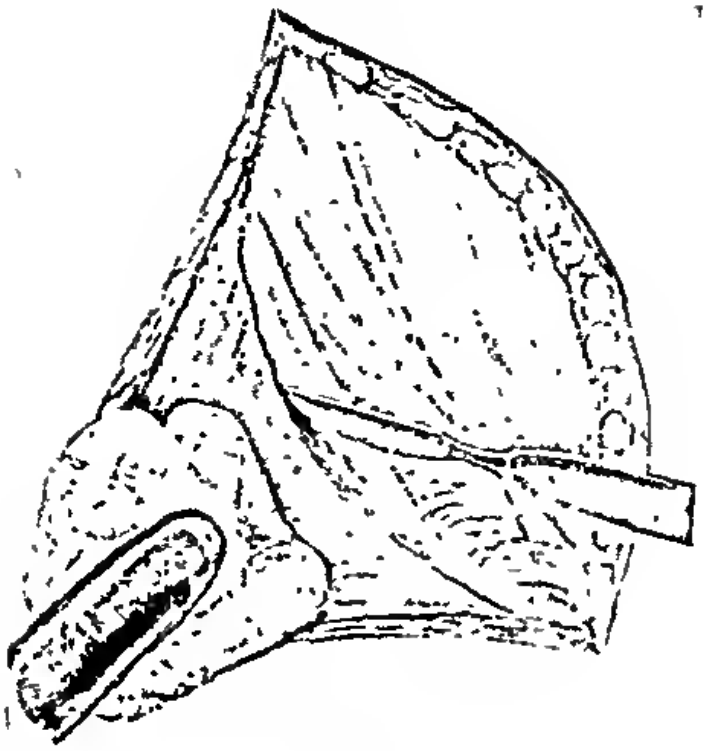


Fig. 186.—Dotted line shows where fibers of external oblique are divided, outer flap of integument dissected to expose Poupart's ligament from above

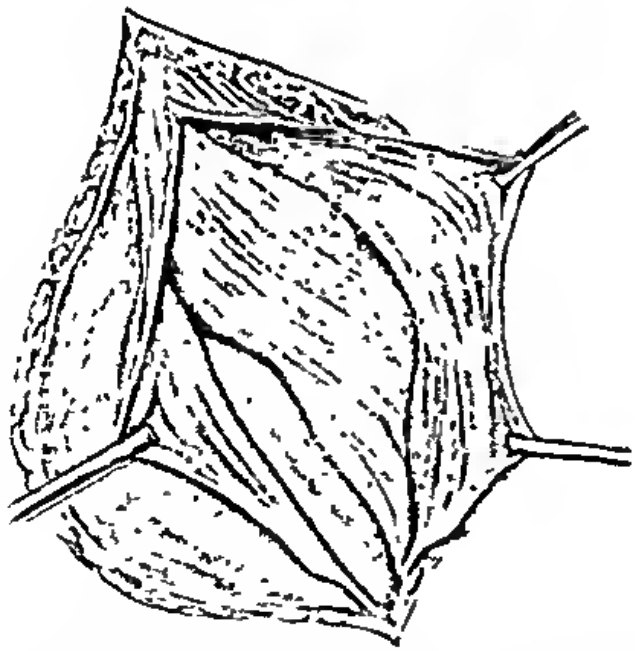


Fig 187.—External oblique muscle divided and cord exposed

outward, thus exposing Poupart's ligament from above as shown in Fig. 186. The inner flap of skin is not dissected from the aponeurosis.

The fibers of the external oblique are then divided as in Fig 187, extending from the upper end of the skin incision down through the external ring The outer flap of the aponeurosis of the external oblique is dissected from the structures of the cord and muscle until Poupart's ligament is well exposed from its under surface The ligament is wiped parallel to its fibers with the gauze covered finger in order to remove any tissue adhering to it, care being taken not to tear the ligament away from its

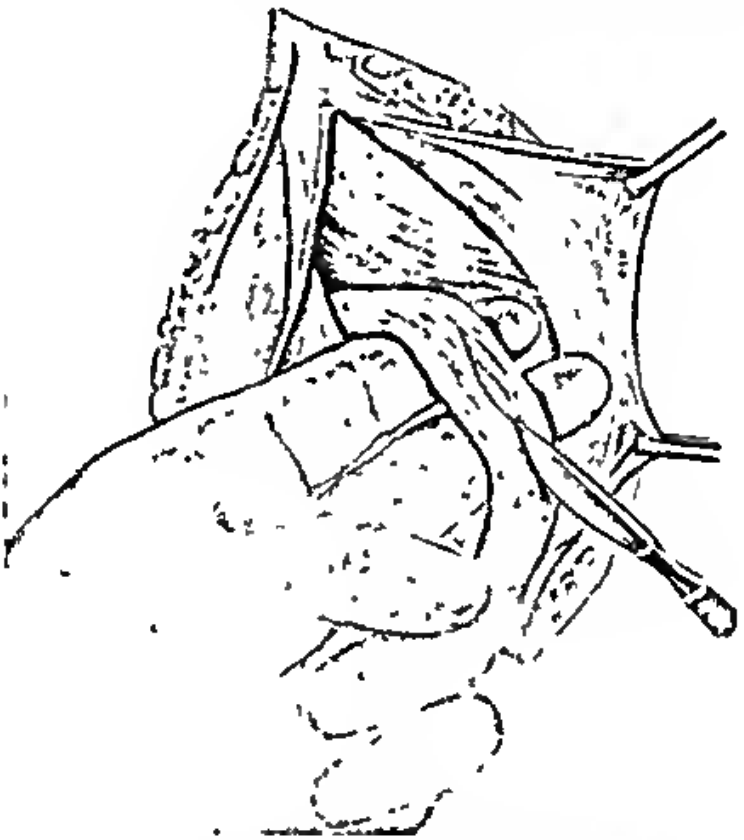


Fig 188.—Two fingers under cord, incision being made through cremaster muscle and fascia in order to expose sac

attachments The inner flap of the aponeurosis of the external oblique is dissected from its underlying structures from the point where the hypogastric branch of the iliac nerve passes over the internal oblique muscle down to the pubic bone, exposing the sheath of the rectus muscle The index finger is passed downward along Poupart's ligament under the structures of the cord and the cord is delivered The index and middle fingers are inserted under the cord and separated, freeing the cord from

its bed from the internal ring to its entrance into the neck of the scrotum, as shown in Fig. 188. The cremasteric muscle and fascia are divided with the scalpel parallel to the long axis of the cord until the sac is exposed The lower end of the sac is grasped with a forceps and the sac is dissected from the structures of the cord. It should be remembered that the vas is always behind the sac unless the cord has been rotated when passing the fingers underneath, hence the vas is not likely to be

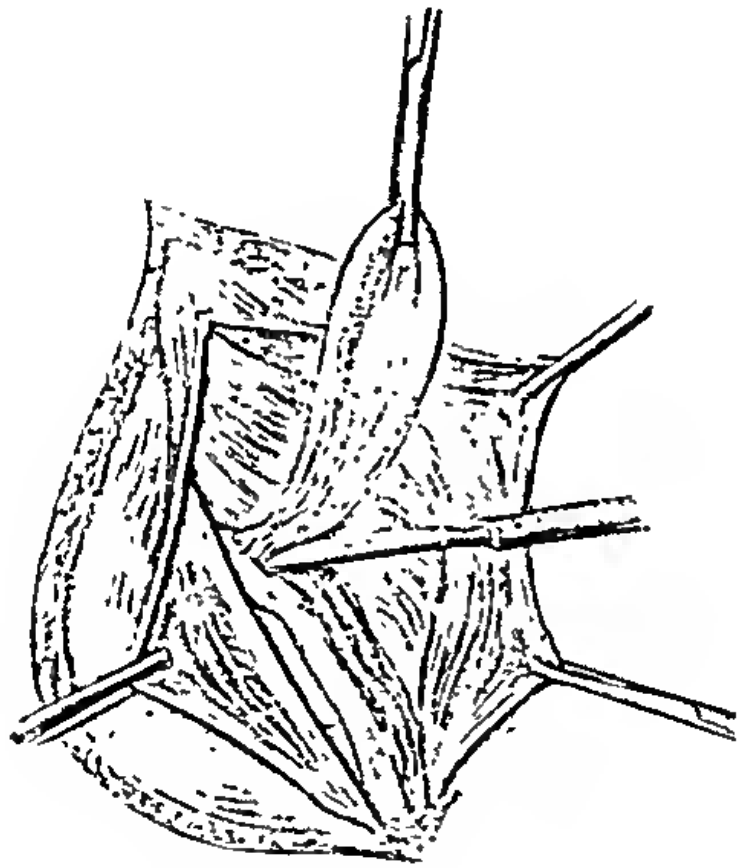


Fig 189.—Sac dissected free from cord

injured until the neck of the sac is approached, at which point the vas is intimately adherent to the sac. The sac is dissected free until the inverted funnel effect of the peritoneum is seen as shown in Fig 189.

The sac is opened and inspected. If free from intestine or adherent omentum a straight Kelly clamp is placed across the neck of the sac, and a No. 1 plain catgut suture inserted and tied under the distal end of the clamp as shown in Fig. 190.

The fibers of the external oblique are then divided as in Fig. 187, extending from the upper end of the skin incision down through the external ring. The outer flap of the aponeurosis of the external oblique is dissected from the structures of the cord and muscle until Poupart's ligament is well exposed from its under surface. The ligament is wiped parallel to its fibers with the gauze covered finger in order to remove any tissue adhering to it, care being taken not to tear the ligament away from its

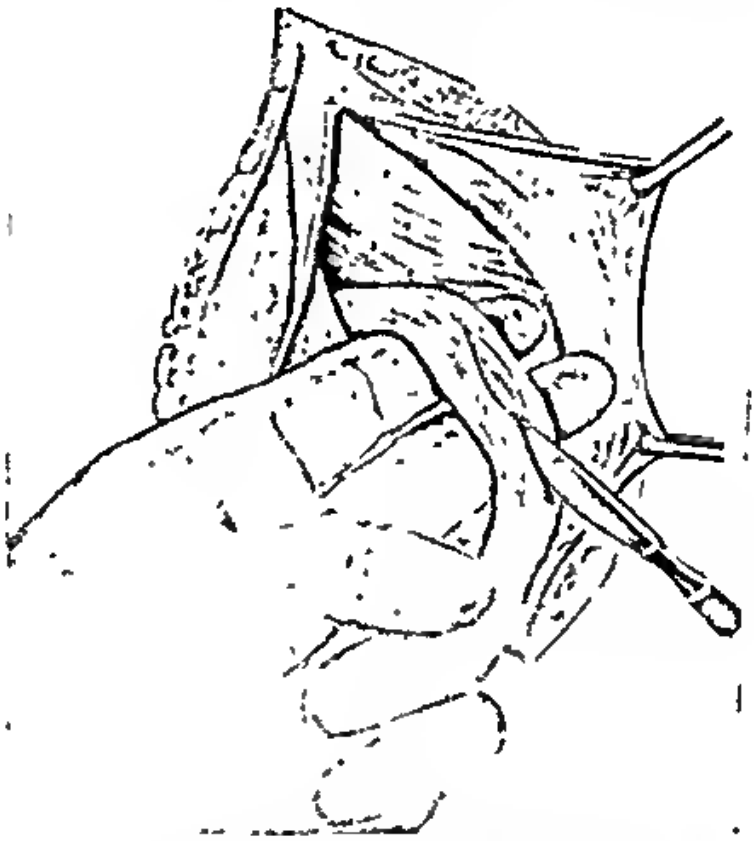


Fig 188.—Two fingers under cord, incision being made through cremaster muscle and fascia in order to expose sac

attachments The inner flap of the aponeurosis of the external oblique is dissected from its underlying structures from the point where the hypogastric branch of the iliac nerve passes over the internal oblique muscle down to the pubic bone, exposing the sheath of the rectus muscle. The index finger is passed downward along Poupart's ligament under the structures of the cord and the cord is delivered The index and middle fingers are inserted under the cord and separated, freeing the cord from

The sac is excised $\frac{1}{4}$ inch distal to the clamp then the same suture is used to suture the neck of the sac over the clamp as shown in Fig. 191. The clamp is removed, the suture drawn taut and tied to the free end which was tied under the point of the clamp The sutured neck of the sac is drawn up under the transversalis fascia and internal oblique muscle to a point about $1\frac{1}{2}$ inches above as shown in Fig. 192 With the same suture the neck of the sac is fixed to the under surface of these muscles This takes

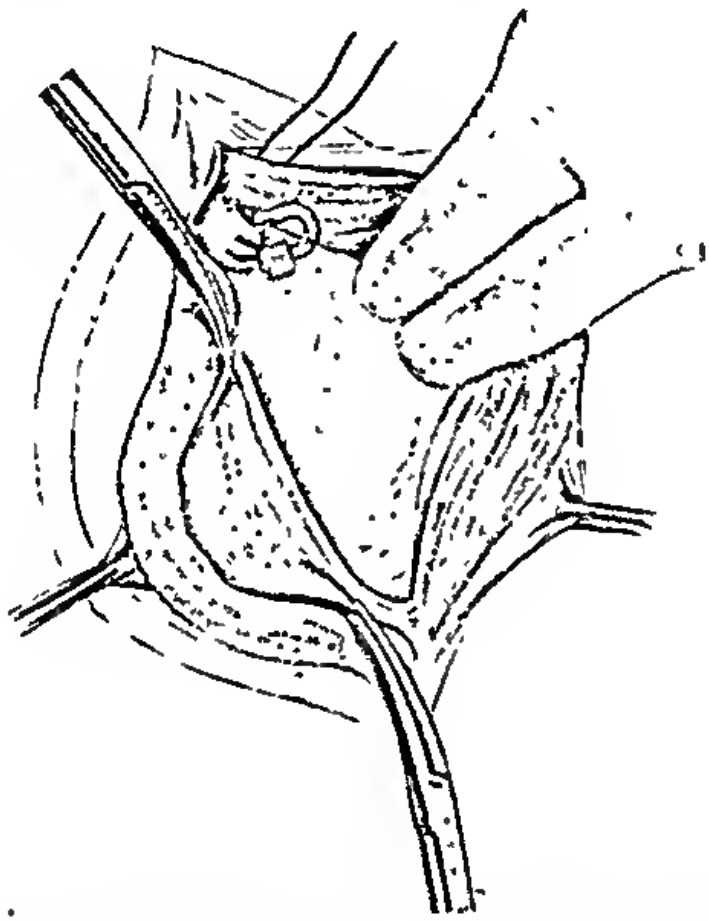


Fig. 192.—Neck of sac sutured and clamp removed Tied neck of sac drawn up under transversalis and internal oblique muscles 1 inch above and tied Two curved clamps applied to external oblique to hold cord out of way

the neck of the sac away from the weakened inguinal canal and removes any dimpling which may be present on the inside of the peritoneum. The cord is lifted to the outer side of the wound and held in place by two curved clamps with the concavity of the clamp downward. The third clamp is kept on the outer flap of the external oblique in order to prevent the cord from dropping

down to the groove on the outer side of the aponeurosis as shown in Fig 192 that it may not accidentally get caught in the sutures to be placed later The edge of the rectus muscle and its sheath are sutured to Poupart's ligament with interrupted chromic catgut sutures beginning about ½ inch above the pubic bone. The suture is carried through the ligament as shown in Fig 193. (Please note that the rectus muscle is not shown in Fig 193 as it should be It appears as though the conjoined tendon alone

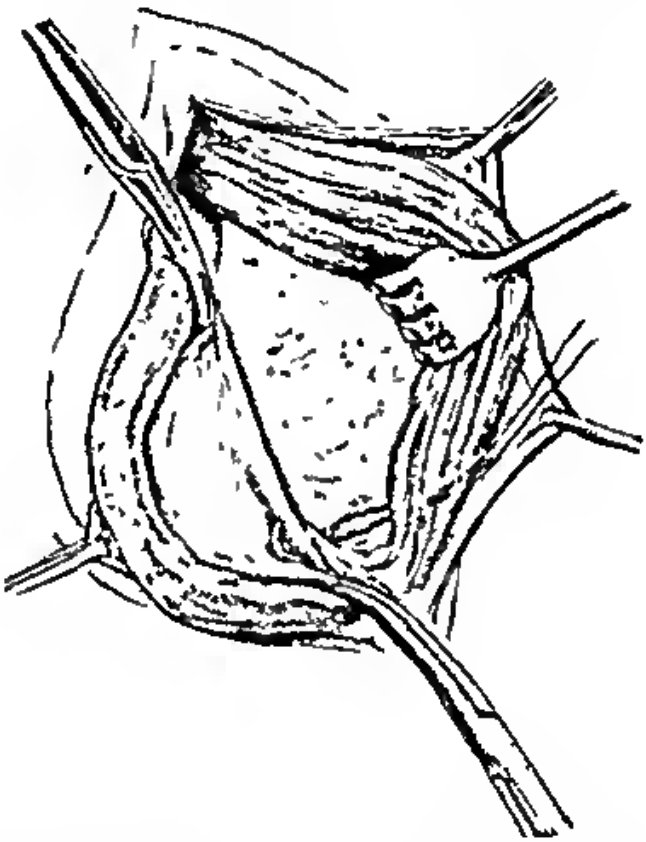


Fig 193 —This shows two curved clamps, concavity downward holding cord to side First suture introduced through sheath of rectus and rectus muscle and Poupart's ligament

is sutured to the ligament.) The conjoined tendon is ignored all together in this operation. Usually two sutures are required *through the rectus muscle and Poupart's ligament.* Then two or three sutures above are placed ½ inch apart through the internal oblique and transversalis fascia, thus fixing these muscles to Poupart's ligament until the internal ring is reached above as shown in Fig 194

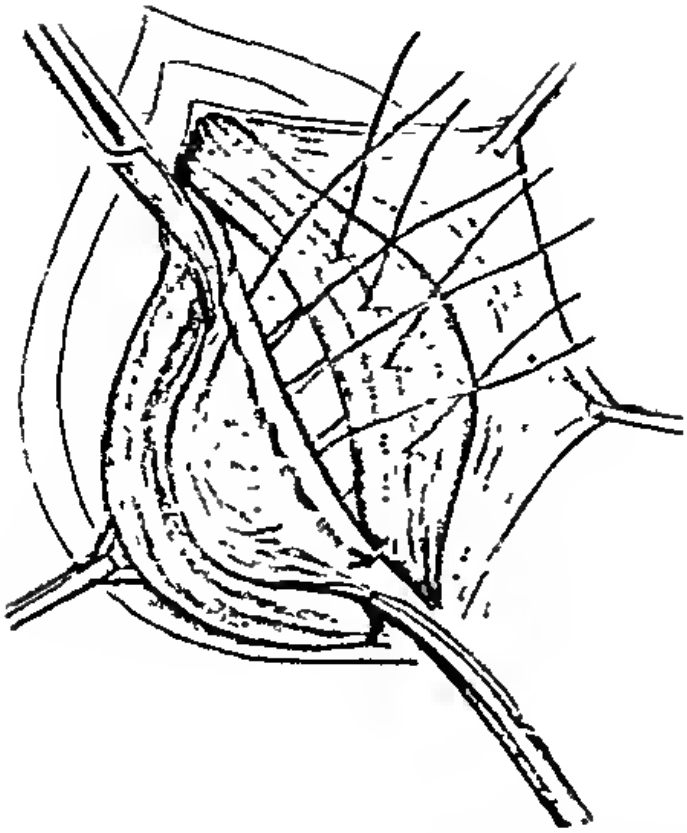


Fig. 194.—First suture tied. All others left long until all five sutures are introduced. Note how sutures go through Poupart's ligament.

DIRECT INGUINAL HERNIA

In operating upon a direct hernia the transversalis fascia is divided by making a circular incision around the neck of the sac through the transversalis fascia down to the peritoneum. The edges of the fascia are clamped, then the neck of the sac is sutured and the sac removed. The sutured neck of the sac is dropped below and the cut edges of the fascia are carefully sutured with No. 1 double chromic catgut. The remaining steps of the operation are the same as in indirect hernia. After all the sutures are tied the two curved clamps holding the cord to the side are removed and the cord placed on its new floor as shown in Fig. 195. Two or three sutures are taken above the internal ring, suturing the internal oblique and transversalis muscles to Poupart's ligament above as well as below the internal ring. With the same running suture, No. 1 chromic catgut, the external oblique muscle is closed over the cord as shown in Fig. 196. No effort is made to close the opening in the cremasteric

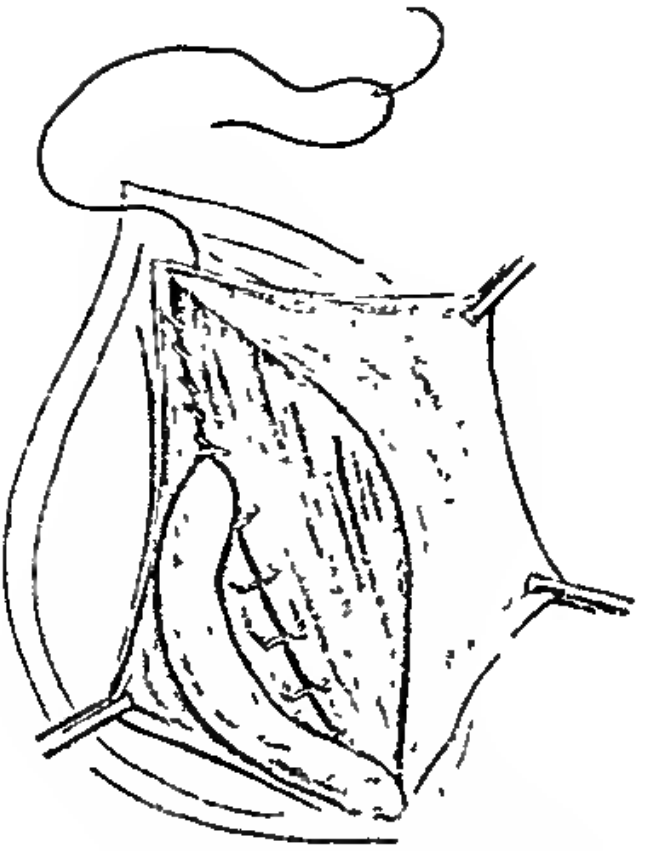


Fig. 195.—Curved clamps removed after all sutures are tied and cord drops back on new floor.

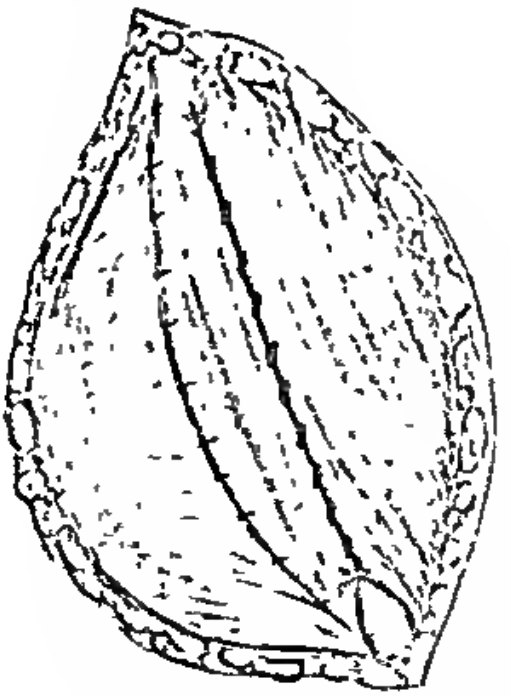


Fig. 196.—External oblique closed snugly around external ring. Dotted line on side shows how chromic sutures go through Poupart's ligament.

fascia surrounding the cord. After the external oblique muscle is sutured the chromic sutures used to close the deeper structures can be seen penetrating Poupart's ligament, as shown in Fig. 196. The deep fascia is closed with No. 1 plain catgut and the skin closed with black silk. A dry dressing is applied firmly with adhesive plaster. The foot of the bed is elevated 18 inches for twelve hours after the operation, which is the routine procedure for all cases operated upon with spinal anesthesia. Patients are instructed to roll from side to side in bed after the first day of operation but are now allowed to sit up in bed until the eighth day. They are allowed to sit out of bed on the ninth day and usually leave the hospital on the twelfth day. Laborers are not allowed to return to heavy work until the sixth or eighth week after operation. Other patients usually return to work at the end of four weeks.

CLINIC OF DR. WINFIELD SCOTT PUGH

City Hospital

VESICAL NECK OBSTRUCTION

It is plainly apparent that some of the class are experiencing a sense of disappointment because permission to operate an interesting care of ureteral obstruction due to a pelvic mass has been refused. However, we have a series of cases this morning that are much more intriguing from the practical standpoint, albeit less spectacular.

The first case is one of vesical neck obstruction not due to prostatic hypertrophy. One of the most maligned surgical procedures is the operation known as prostatectomy.

"Prostatectomy, as an operation, is usually a failure," is a common expression. When, after an appendectomy, symptoms persist—because they were not produced by a diseased appendix but by a stone in the ureter or by a right seminal vesiculitis—the appendectomy is not regarded as a failure Rather is the error considered one of surgical diagnosis and judgment. A not dissimilar situation exists with regard to prostatectomy. More innocent glands are attacked than most of us suspect Almost every man past the age of sixty years whom we have seen with a urinary obstruction was previously diagnosed a case of prostatic hypertrophy. Only too often are such patients operated under that diagnosis. A practically normal prostate is "gnawed" on for awhile, but the symptoms are not relieved and the prostatectomy is blamed. We have seen prostates literally ripped from bow to stern in a futile attempt to get them out, when the trouble was not in the prostatic lobes at all, but in other structures at the bladder neck. We are willing to concede that males past sixty, in about 30 per cent of the cases, in whom a urinary obstruction

is present the obstruction is due to a prostatic hypertrophy, but this is not a fact that should be taken for granted. A prostatic adenoma ought to be demonstrated before an attempt is made to extirpate the gland. Stricture of the urethra may coexist with prostatic obstruction, or it may be present independently, even in the most aged Hypertrophy is quite uncommon, of course, in those under sixty years of age.

Etiology of Bladder Neck Obstruction.—What are the causative factors at work in blockage of the vesical orifice other than prostatic hypertrophy? The answer is by no means clear. The subject is one over which much controversy wages and, at most, we can only state an opinion which we may find it necessary to revise on the morrow.

However, recalling the anatomy of the deep urethra, prostate, and bladder neck, we see a number of structures that are capable of producing no little damage when subjected to a chronic inflammatory process. The most prominent of these structures are the median portions of the prostate, lying beneath the mucous membrane This is capable of giving rise to a definite ring around the neck of the bladder. It may assume, in an early stage of development, the form of a prostatic bar; or, later, it may cause a definite collar ring obstruction

Next in importance are small masses of glandular tissue just beneath the trigone. These are sometimes known as the subtrigonal glands or Homes glands, having been first noted by Homes in 1811.

The third group is an enlargement of the tubules below the mucous membrane of the internal sphincter, known as the subcervical or Albarran's glands The name "prostatic bar" applied here is rightly objectionable to some teachers. It is not ultra-scientific, but it is expressive It is our experience that subcervical glands have been responsible for about 75 per cent of the nonadenomatous vesical neck obstructions we have encountered The subtrigonal glands account for about 15 per cent and other inflammatory conditions for about 10 per cent of the cases

Underlying Factors.—Having learned that prostatic hyper-

trophy is not the only cause of obstruction at the vesical neck, let us see if we can trace some of the roots of origin of these bars. It has seemed to us that we are dealing in this case with a chronic inflammatory condition of many years' duration. Many of you will readily recall the pathology of urethral stricture. How often young men, partially cured of an old gonorrhea, go along for years little realizing the formidable menace developing in the urethra. Then suddenly the gravity of the situation becomes apparent because of the occurrence of complete retention.

A long service on the trail of the gonococcus has convinced us that it alone is responsible for most of the vesical neck obstructions. A statement to the effect that only 10 per cent of gonococcal infections are actually cured will evoke a protest, we know, and yet it is true. The vast majority of gonorrheal patients discontinue their treatment as soon as the discharge is no longer noticeable. Only too many drift away earlier with the cessation of the burning sensation. The patient desists but the gonococcus, or, rather, its successors, does not. Instead it continues to pile up inflammatory masses, particularly between the bulb of the urethra and the bladder ring.

If one cystoscopes his cases of seminal vesiculitis, prostatitis, and chronic urethritis, he finds most of the structures at the vesical neck involved. Cysto-urethritis with involvement of the Homes and subcervical glands is very common. Round-cell infiltration has gone on for years in one or all of these structures. At times a definite bar appears. As the result of considerable study, we are of the opinion that these conditions are the result of an old urethritis of gonococcal origin. The etiology of prostatic hypertrophy is still in doubt. It may be definitely adenomatous, or mayhap a hyperplasia. If it is really of adenomatous origin, why do we not find it more frequently in the anatomical rooms?

The cysto-urethroscopic pictures presented to us in these cases differ slightly in individual cases, but they reveal the obstruction of the bladder neck in varying degrees. Let us now proceed to the first case.

Illustrative Case.—Mr. H R, white, age forty-seven years, shoemaker This man tells us that he had a gonorrhea between fifteen and twenty years ago He was treated by a druggist and was apparently cured by "two bottles of injection" Aside from the fact that he had frequent attacks of lumbago he has felt generally quite well Since we know that the prostate and seminal vesicles are most frequently responsible for the pains of lumbago the history of lumbago is particularly important

Present Complaint—The patient has been visiting the dispensary off and on for several months, complaining of cloudy urine and not only the fact that at times the urine passes with difficulty but that the flow may be shut off in the middle of the act of urination He was last seen about two months ago, when he stopped treatment because he had improved greatly under medication of the prostate and vesicles He has now returned, apparently very sick, stating that he cannot void urine without a catheter. Examination of the urine has revealed much pus in both glasses

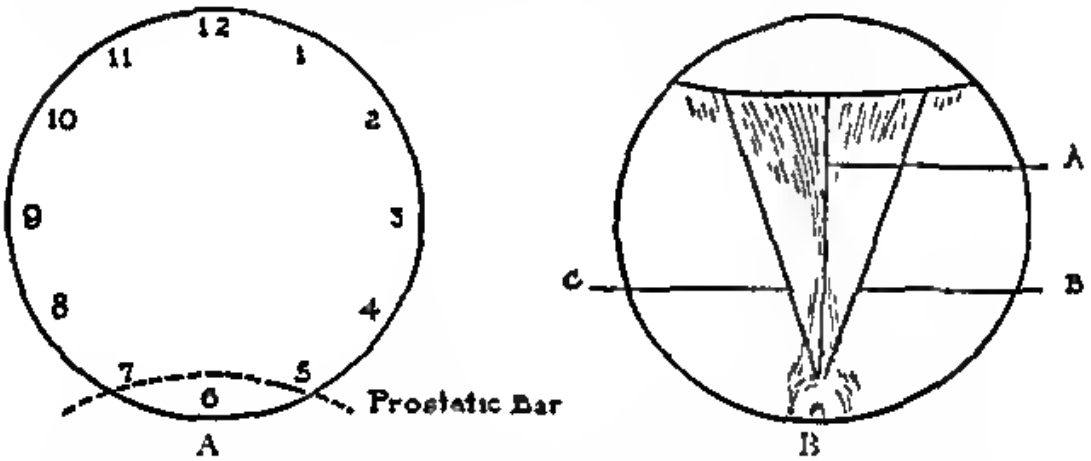


Fig 197—A, Represents the face of the clock with prostatic bar projecting at 5 and 7 B, *A*, Midline incision from bladder neck to verumontanum *B*, Incision from 5 o'clock to verumontanum *C*, Incision from 7 o'clock to verumontanum

Urethral Examination—Here, as is our custom in all urinary cases, we first pass a web bulbous bougie No 16 F The instrument enters readily without any obstruction down to the vesicle neck At this point there is a little interference, but the bulb finally passes in On withdrawing the bougie, quite a definite hang is noted at the bladder neck Rectal examination suggests a somewhat enlarged prostate which is the seat of an old inflammation Both seminal vesicles are large, tender, and by no means empty on pressure. We have tried to pass a rubber catheter on this man but without any success, *even though the small bulb did go over It was then decided to do a cysto-*urethroscopic examination if possible

The cysto-urethroscopic examination was alright as far as we were able to go A McCarthy type instrument was first tried and it entered as far as the bladder neck The anterior urethra looked good, but in the region of the bulb a low grade infiltration was noted on the floor of the urethra The colliculus is clublike in appearance and the orifices of the ejaculatory ducts

seem to gape. Considerable granulation tissue is noted in the postmontane urethra and pus flakes are numerous. While we were unable to enter the bladder with this instrument which was a No 19 F , one could note that there was a marked thickening and elevation of the posterior vesicle lip This is the posterior commissure tissue of the prostate and is that of which Randall is wont to refer to as glandular median bar He also states, you will remember that this form of hypertrophy is constantly confined to the prostatic capsule and always under the trigonal muscle

Treatment.—What are we going to do for this man? What treatments are available? We may use the Collings electrotome, the McCarthy illumin-

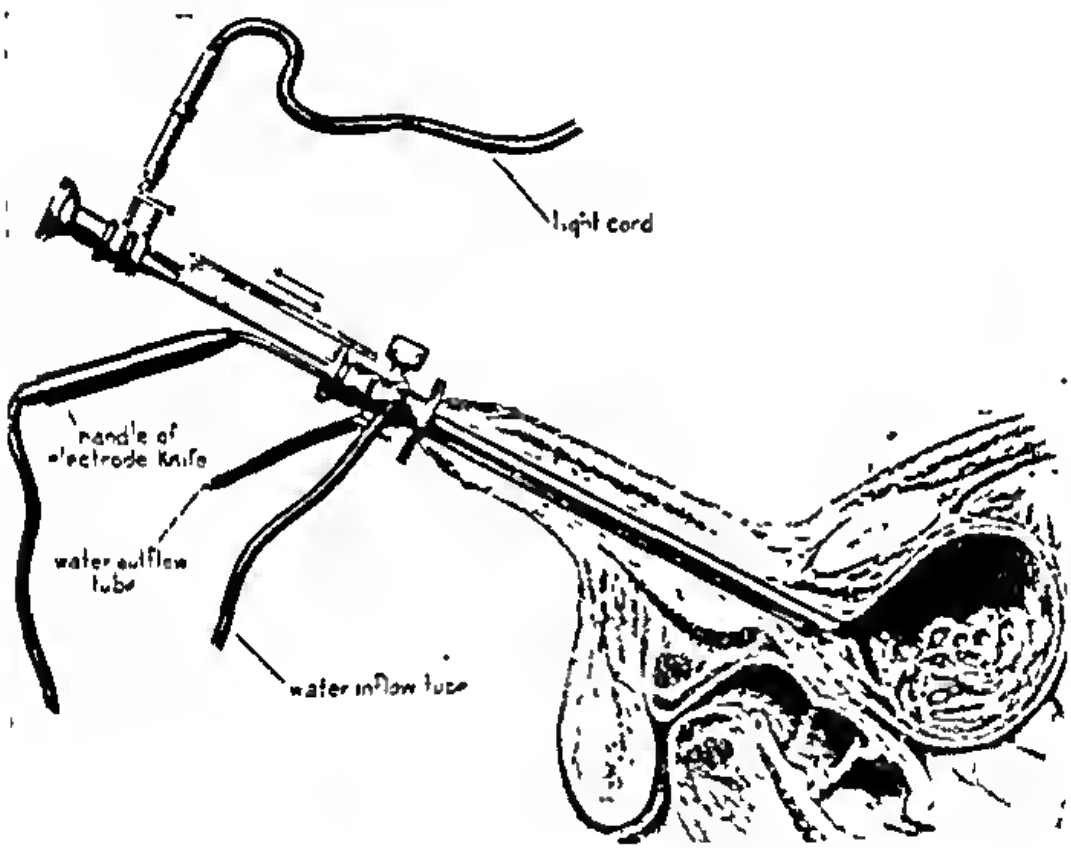


Fig. 198.—The Collings instrument in place Note the electrode incising median bar

ated punch, the plain Young punch, or the Keyes rongeur Where there is a small bar of tissue interfering with the urinary flow, often a simple application of the Young's punch without vision will suffice You will say, but the instrument just referred to has a lamp, quite true, but few find it of assistance As our bladder neck is pretty well obstructed we shall not try to force an instrument into it. Instead, we shall attempt to cut through this bar from before backward with the Collings electrotome The house surgeon reports the spinal anesthesia has been given

Technic.—First, let us see that all our electrical connections are properly made. Some manufacturers will tell you it is safer to operate an electrical cutting instrument in the urethra and a cystoscopic lamp at the same time

provided they are on different currents This is a temptation, but you will not yield to it a second time, I am sure, after one experience Use a wall socket for the cutting current and a pocket battery to run the cystoscope

Our electrotome instrument is passed through the McCarthy panendoscope arranged for continuous irrigation We shall first engage our electrotome knife on the bladder neck at figure six on our imaginary clock dial The cutting current is now turned on and the knife forced from the veru through

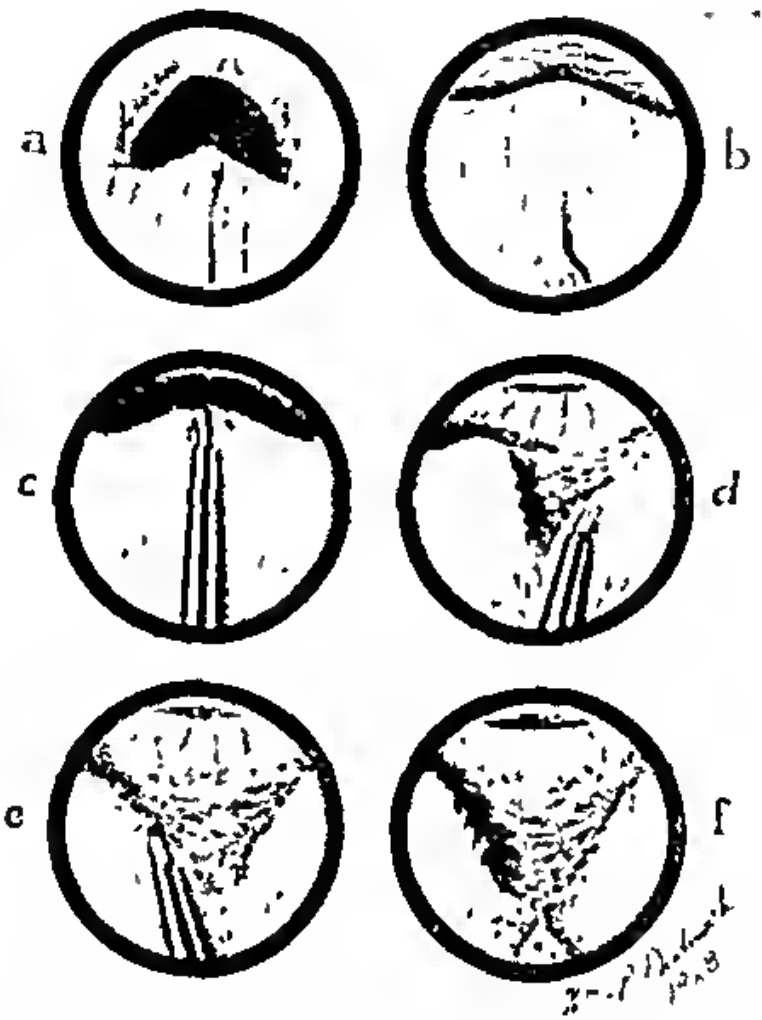
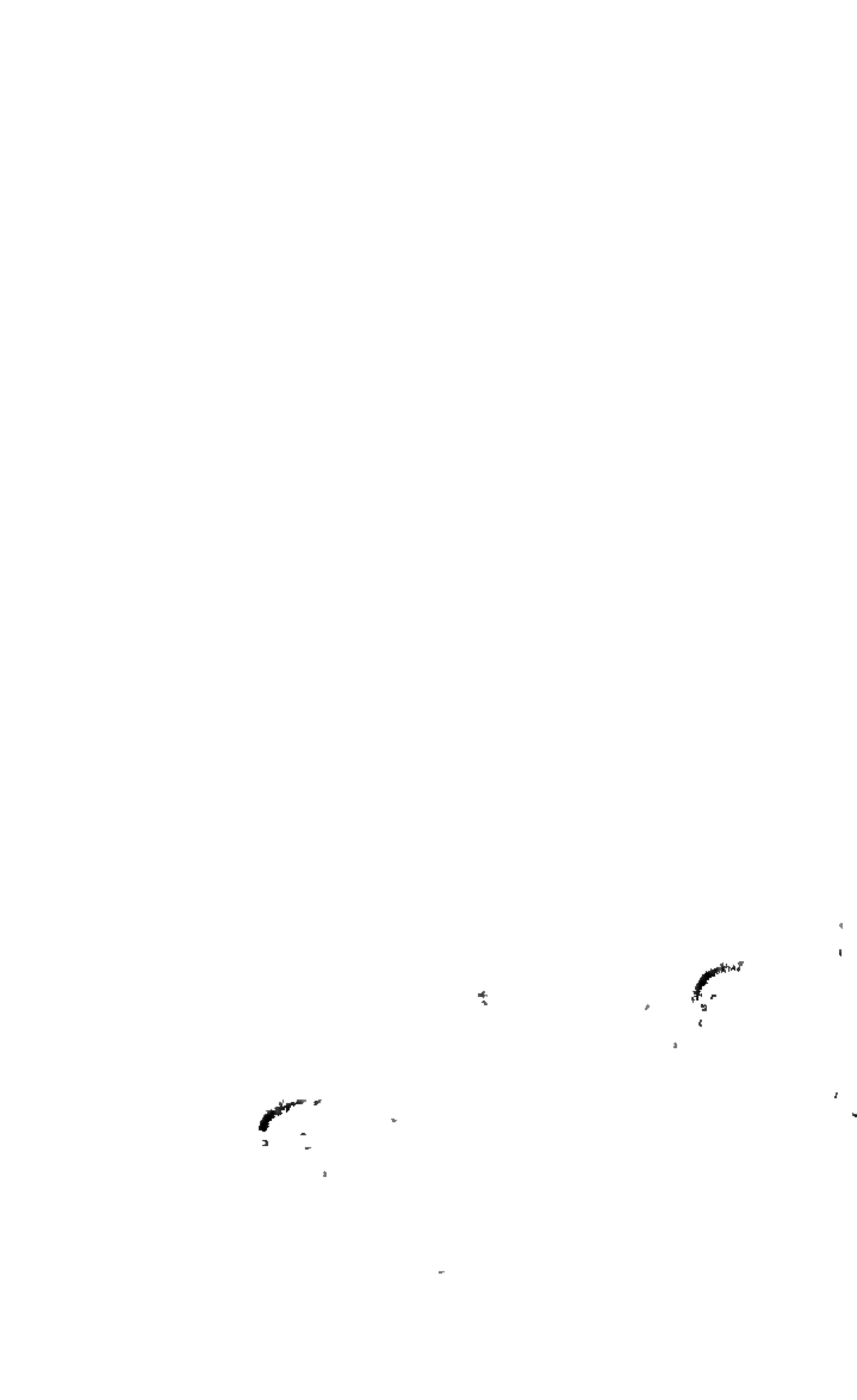


Fig 199.—Showing actual stages in the operation of Dr. Clyde Wilson Collings for median bar obstruction *a*, Bar of bladder neck. *b*, Close-up of fibrous bar *c*, Electrode cuttings at 6 o'clock *d*, Cutting at 5 o'clock *e*, Cutting at 7 o'clock *f*, The completed operation.

the bar into the bladder You will notice the shower of bubbles sent off from the cutting edge, incident to the dehydration process Another cut is made corresponding to 5 o'clock and yet a third extending from the bladder neck down the valley to the verumontanum The diagrams (Fig 197) show our movements quite clearly You will note that we moved the electrotome and the cystoscope together in making our incision as it avoids short circuiting Any tufts of tissue left may be easily removed with forceps

You will say, what are the possibilities of bleeding after an electrotome resection of the vesicle neck? It has been said by those who advocated an electric cutting attachment in the Young's punch, that it eliminated danger of bleeding. I regret to say that is an oversight as hemorrhage may occur and it has happened to me more than once with all such instruments, including that of Collings Always have your interne on the watch for it and when occurring lose no time in placing an indwelling catheter in the bladder and oozing will cease

Postoperative Treatment—About all that is necessary is rest in bed and a mild urinary antiseptic to relieve our conscience



URETERAL CALCULUS: ITS REMOVAL BY VAGINAL URETEROTOMY

One of the very valuable methods in the examination of the female is that of vaginal palpation of the ureters This technic was first introduced by Saenger, in 1886, when he announced that the ureters were palpable per vagina from the base of the bladder in the parametrium and even higher. Naturally, the ability to put this method into practical use depends upon the eduction of the finger tip.

It has been said by competent observers that the normal ureter is easily palpable from the side of the pelvis just above the spine of the ischium, where it lies underneath the peritoneum and previous to entering the broad ligament on its way to the bladder. I regret not possessing tbe skill of my esteemed colleagues to locate a normal ureter in this way. Neither have I—despite countless attempts and practice—been able to palpate a nonpathologic ureterovesical tract by rectum. Whatever difference of opinion there may be as to palpation of the normal organ, there can be none with regard to palpation of one that is distinctly diseased. In marked ureteritis, tuberculosis and stone a definite thickening can be felt beyond shadow of doubt

It is not our purpose to go into the details of ureteral palpation but to demonstrate its practical application in the removal of a stone impacted there. In spite of the fact that, while watching a well known surgeon struggling to remove a stone in the lower ureter, I heard him remark that such a procedure is never difficult, I cannot agree. It is my surgical experience that many knotty problems may be encountered in the successful removal of a ureteral calculus impacted in the pelvic portion of the ureter. This being a fact, when a technic is proposed which obviates some of these difficulties it should be given due consideration.

I know that you are going to say, did he not tell us 85 to 90 per cent of stones pass spontaneously or can be removed by intra-ureteral method Quite true. I did make that statement but you will notice we allowed ourselves a margin of 10 to 15 per cent Not many ureteral stones require ureterotomy but a certain number do so very definitely.

Treatment of a Ureteral Calculi.—Let us review for a few moments the methods of handling stone in the ureter; what treatment shall we employ? The answer to this can seldom be given without a thorough understanding of the factors underlying each case. Methods of treatment may be divided into the operative and manipulative

The following are definite indications for operation:

1 When a ureteral stone is large, that is usually more than 2 cm , and when it does not progress through the ureter

2 When the kidney is being distended.

3 When reflex anuria occurs.

4. When other diseases contraindicate long attacks of pain.

5. When the patient cannot withstand without severe reaction the cystoscopic treatment.

This we believe is a very sound basis for considering operative approach and one which we have followed with a great amount of satisfaction.

When our examination shows us that the patient cannot be grouped in the classification above noted the following methods are at our disposal: Ureteral dilatation in some form or the use of indwelling catheter Both methods are of great value.

Peacock reports 50 per cent, Cromwell 65 per cent, Dourmashkin 70 per cent, Walther 88 9 per cent, Ballinger and Elder about 90 per cent of stones removed by catheter and bougie manipulation In a series of 123 consecutive cases reported before the New York Academy of Medicine, we cited 102 removed by dilatation. Beer has reported 60 per cent with the use of the indwelling catheter

"How long should one keep up these dilatations?" you ask.

Time does not enter into it at all. When there is evidence of increasing urinary obstruction and kidney damage stop the

dilatations at once and proceed with a ureterotomy. When a stone becomes impacted in the upper ureter requiring removal, its extraction through the ordinary kidney incision presents little difficulty. In the lower third, ureterotomy through an incision along the outer border of the rectus muscle, or just parallel to the upper border of Poupart's ligament may be employed. That either of these are not particularly easy of accomplishment must be apparent. In the male we have no alternative. When the woman comes into the picture we often think of vaginal section.

The first cases of vaginal ureterotomy that we have been able to find were those of Israel reported in 1896. He was, however, not satisfied with his results and returned to the abdominal method. Jacobs and Garceau followed later with an improved technic. After the above very little was accomplished until the publication of the work of Judd in 1920 and our own. Recently some research has been done by Lower who reported 6 cases in 1925. In the case we are about to present the only reason why we are doing a vaginal section is because of her refusal to have an abdominal operation.

Illustrative Case.—Mrs. R. C, white, married, native of Italy, age thirty-three years. Mother of five children

Family History.—Nebulous and of no value.

Previous Personal History.—Aside from the usual diseases of childhood and the five pregnancies has always been fairly well Yes, she did have some kidney trouble with her last baby, born two years ago This was probably a pyelitis although it is not usual in late pregnancies This reminds me the last case of this kind we operated on developed a pyelitis at the fourth or fifth month of pregnancy and was aborted at that time. Just let me remind you that this abortion stuff may relieve a pyelitis but it certainly does not cure it—no, never. In that case the stone was undoubtedly based on that old pyelitis with urinary interference. That good old combination, urinary stasis and infection is undoubtedly the cause of all urinary calculi.

Present Illness.—Mrs. C. states that for the past six months she has been bothered with lumbago on the right side. This painful condition has been gradually increasing in severity. She says that attacks of pain now begin up in the right costovertebral angle and shoot toward the midline of abdomen, at times downward toward the right thigh. These pains are very sharp and knifelike, she rolls around the room, being unable to find any position of comfort. This at times has lasted for hours and can only be relieved by morphia. Attacks of nausea and vomiting having occurred with the paroxysms; a diagnosis of biliary calculi was made. Of late her attacks occur about

once a week and she is becoming quite alarmed Recently blood has been seen in the urine

Examination shows a woman of about 5 feet 5 inches, weighing 175 pounds, therefore quite well nourished Heart, lungs, and nervous system are reported normal by the internists The abdomen is fat and flabby. On palpation and percussion nothing is elicited until the right costovertebral angle is reached, where she is extremely sensitive to mild touch No mass formation can be detected nor do our manipulations produce any painful radiations By vagina we note evidence of old tears in the perineum and cervix Aside from this the uterus appears normal, the left tube and ovary are not palpable On the right side the same conditions prevail as far as the adnexa are concerned High up and hugging the area opposite to the internal os there is a hard stone-like mass The latter cannot be moved up or down by manipulation

The urine is acid 1 027, very dark in color with traces of albumin, free pus, and blood Microscopical examination reveals many pus cells and abundant red corpuscles

Cystoscopically we note briefly the following Urethra and bladder neck are normal Aside from marked injection around the ureter of right side bladder is normal Clear urine comes in spurts from the left side and a much smaller amount appears on the right A No 6 F catheter passes readily to the pelvis of the left kidney On the right we can enter the ureter for about 1½ cm. Repeated attempts of several observers fail to pass this point I should add that urine from the left kidney pelvis seems normal in every way Five cc of indigo-carmine solution was injected intravenously and appeared in a strong stream from the left ureter in about seven minutes A scanty flow appeared on the right in about ten An *x*-ray picture with a catheter passed up to the obstruction was taken (Fig 200) It shows a calculus embedded apparently in the ureter about where it enters the bladder Attempts to force fluids passed the obstruction for a pyelogram all fail Dilatation of the lower ureter has been repeatedly tried with Dourmashkin and Bransford Lewis dilators as well as with all kinds of catheters

In one attempt a catheter apparently became wedged between the stone and ureter Patient was extremely hysterical and ether had to be given to relax her, whereupon the catheter was readily removed Just remember this little incident as it will probably happen to you may be more than once Do not get stampeded, simply administer an anesthetic to the relaxation point and you will encounter no trouble

In spite of the fact that we cannot demonstrate it, I fear there is considerable damage in that right kidney and the stone must be removed For some reason known only to herself patient will not permit an abdominal operation, so we told her the stone could be removed by vagina, to which latter procedure she has consented

Operative Technic—Lower quotes Garceau as having described his operation in 1904 as one devised for cases in which the condition of patient was such as to necessitate the briefest possible operation By this method, the anterior vaginal culdesac was incised just in front of the cervix, the bladder and peritoneum were pushed back as far as the broad ligament, and then this latter structure was everted backward with the tip of the finger The stone

was caught with the digit crooked at the last point, forced downward toward the vaginal outlet, cut upon and squeezed out. The vaginal and ureteral incisions were sutured and the culdesac kept open with a small cigarette drain. The whole operation usually lasted ten minutes and the patient recovered without a fistula.

The operation of Judd and Lower differs little and theirs is the one we shall continue to use here.

Operation.—The patient, having just been given a spinal anesthesia, is placed in the Sims position with the side to be operated uppermost. A broad speculum of the Auvard type is introduced and the cervix is grasped with a

Fig. 200.—Shows catheter tip beneath stone in lower right ureter.

tenaculum and drawn to the opposite side as you see in the illustrations (Figs. 200–202). This manipulation draws down the bladder base and the ureter as well. We now introduce the finger and palpate the stone, noting that it has not moved since the last examination.

An incision is made just lateral to the cervix and parallel with the ureter. The tip of the finger is inserted through this incision and the ureter with stone again palpated. A Sheppard hook such as is used in external urethrotomy or a small aneurysm needle is passed around the ureter above the stone and the stone is brought into the wound. Here one needs use great care lest the circulation of the ureter be interfered with. The ureter is now incised

in its long axis and the stone removed As you see this calculus is very irregular and looks as if it had been broken off from another mass

According to those who have used this procedure, after we have applied a couple of fine catgut sutures all will be well We cannot be quite so optimistic because all of our cases have drained urine through the wound for several days—one as long as two weeks Young has said some of these fistulae may persist longer and we think him right, although Lower claims that the longest he knows of was drainage for twenty-one days We know, also, of a case in which there was a large slough due to interference with the circulation of the ureter

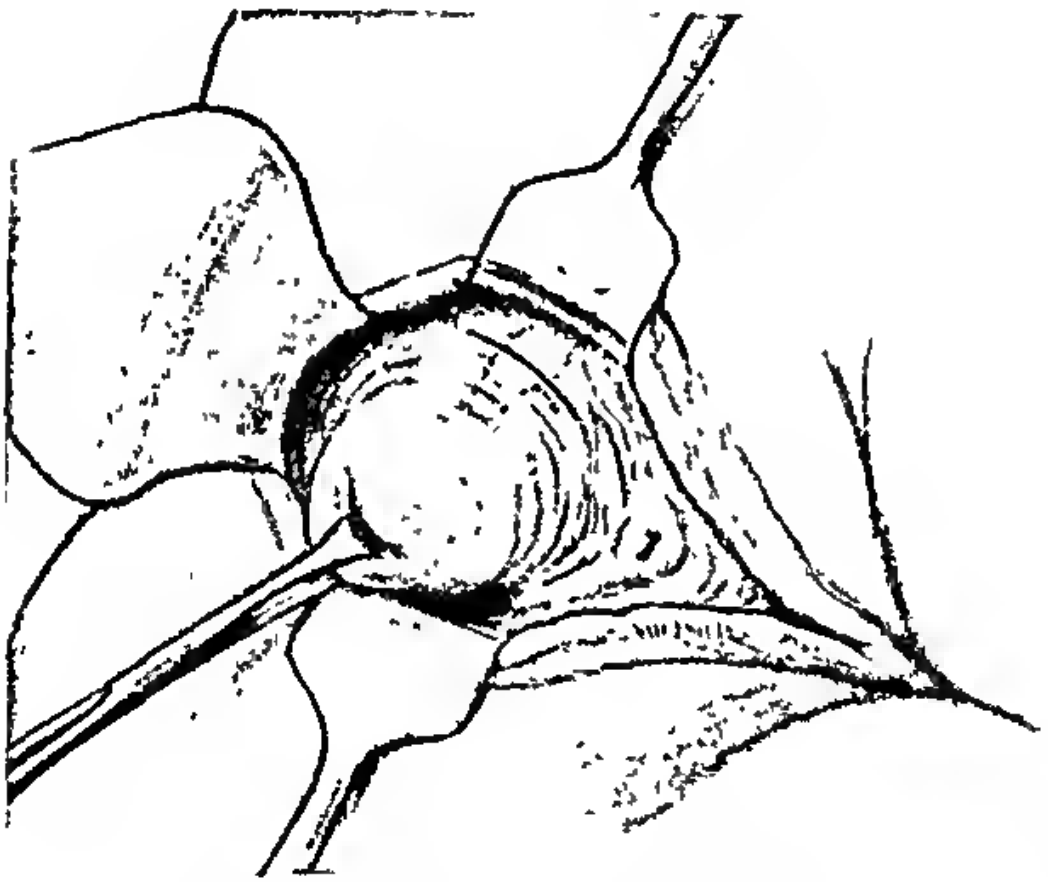


Fig 201.—Patient in the Sims position Cervix drawn over to the left Incision being made over stone in right ureter

Those who advocate this method for the removal of these low stones give the following reasons

1 It is a comparatively simple method of removing a stone from a location which is often difficult by other means

2 Good opportunity for drainage should leakage occur It is pretty sure too.

3. It avoids an external incision as you known our patient was not willing for an operation, but was willing to have the stone removed

4 It shortens the period of convalescence Of this there is no doubt

Note this patient drained urine for four days and left the hospital healed on the tenth day.

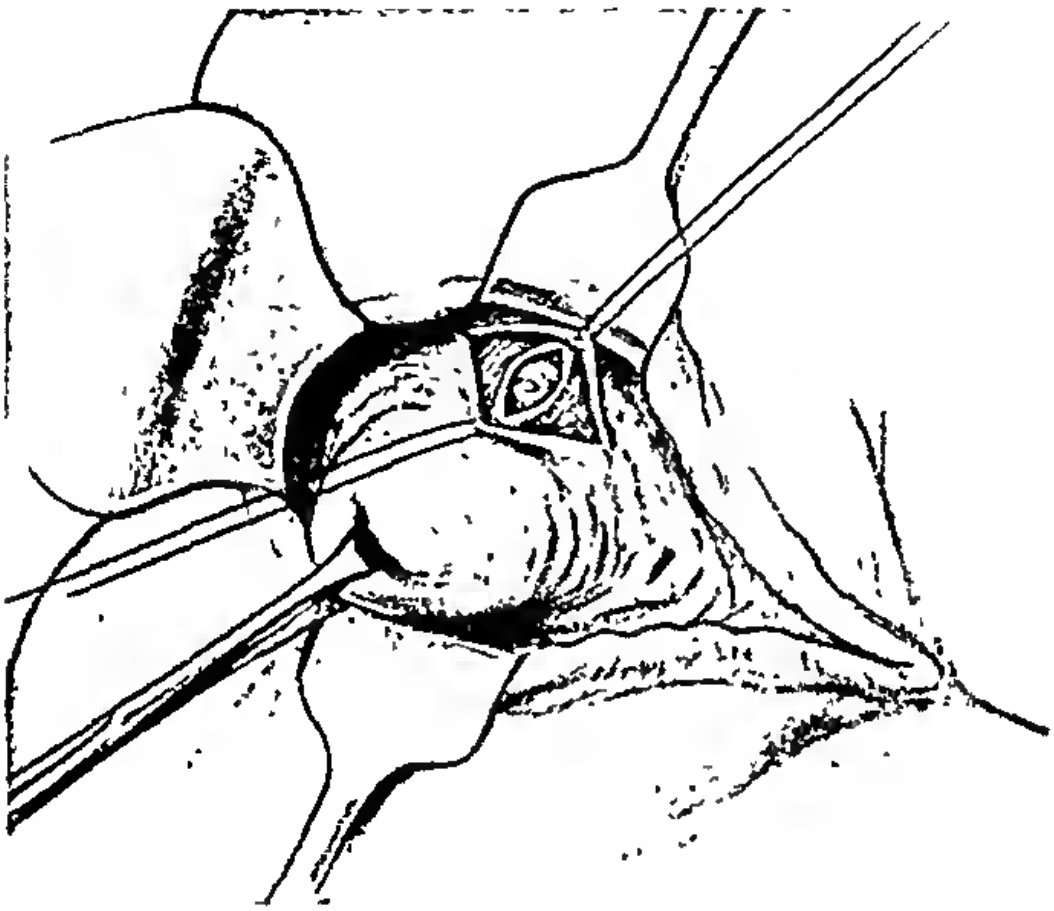


Fig. 202.—An incision having been made in the right vaginal fornix and ureter exposed The latter is now groped and opened Retention sutures are placed in each side of vaginal mucosa, while stone is being removed.

CLINIC OF DR. GUILFORD S. DUDLEY

Bellevue Hospital

VISCERAL NEUROFIBROMA

The first case this mroning is presented to illustrate not only the difficulty that one encounters in the diagnosis of a very unusual lesion but the reliance that may sometimes be placed in a clear, intelligent history.

Mrs E. S, the patient, was forty-nine years of age at the time of her operation. Prior to an operation she had had fourteen years before the present admission she had had twelve normal pregnancies, hut after that procedure, which was some type of uterine operation, she had no more She was quite well until ten months previous to the present procedure, when she began to notice a sensation of tightness in her left upper abdomen This sensation occurred only while she was in a sitting position, being relieved by lying down or walking about. The tight feeling was persistent in nature, but was accompanied by no other abdominal symptoms

Two months after its onset, she applied at another hospital for relief and there a left inguinal hernia was repaired, but without relief. Eventually she noticed a lump in her abdomen in the region of this tight sensation and entered Bellevue Hospital for diagnosis Throughout this period of time she had gained rather than lost weight, and when she entered the hospital stated that her general physical condition was excellent.

Physical examination showed her to be a rather obese adult white whose abdomen reveals two firmly healed scars, one from her uterine operation and the other from the herniotomy. The question of the presence of a mass in the left upper abdomen was exceedingly difficult to determine since approximately one half of those who examined her could feel no abnormality Radiographic examinations of her gastro-intestinal tract were normal, as were roentgenograms and pyelograms of the bladder and kidneys Her Wassermann reaction was negative and her blood count, as well as her blood chemistry, showed no deviation from normal Because of the patient's persistent symptoms and because of the fact that some of the examiners seemed to feel a mass in her upper abdomen she was operated upon for exploration.

The abdomen was opened through a left upper abdominal split rectus incision and the spleen, liver, and gallbladder were palpated Gallstones were found to be present within the gallbladder, and in the mesentery of the small intestine a spherical mass approximately 2 inches in diameter was found.

It extended from the mesenteric attachment of the intestine toward the root of the mesentery. The duodenojejunal junction was not identified so that the exact level at which this tumor mass arose was not determined. To accomplish its removal, it was necessary to resect about 2 feet of the intestine and to ligate many large vessels in the mesentery. The reestablishment of the intestinal lumen was accomplished by an isoperistaltic, side-to-side, suture anastomosis. After removal of the tumor, examination in the gross showed it to have distorted the lumen of the overlying intestine into the shape of a horseshoe, but not to have caused any interference in the continuity of this lumen. The mass itself appeared to have arisen from within the structures of the mesentery and there could be detected no communication with the wall of the intestine. The mass was of extremely firm consistency, and appeared to be well encapsulated. It was of a uniform grayish appearance on section.

Microscopical examination of the tumor showed it to consist of firm fibrous tissue. In one area could be seen the section of a nerve trunk from which the fibrous structure apparently had arisen, thus establishing a diagnosis of neurofibroma. In view of the rather frequent tendency for the occurrence of multiple fibromata in the skin and the observation that the internal nerve filaments are occasionally similarly affected, it may be that this patient's mesentery contains other such fibrous masses. Naturally, however, under the circumstances no extensive search for such tumors was made. Careful examination of the surface of her body shows no fibrous tumor masses such as are found in Recklinghausen's disease.

The patient's postoperative course has been uneventful, the wound has healed by primary union and she has been relieved up to the present time (one month) of her symptoms.

GUMMA OF THE LIVER

Mr. H L. is an Armenian, forty-eight years of age, whose past history includes several attacks of intestinal illnesses suggestive of some type of dysentery during the past eight years. In the intervals between these attacks he enjoyed fairly good health up to the present time He claims to have known that his spleen was enlarged for several years and was told that this was due to frequent attacks of malaria

During the past four or five weeks the patient has lost 4 or 5 pounds in weight and has suffered for the first time from discomfort in his upper abdomen. He has also noticed a mass in this region which is moderately tender to pressure and which he thinks is increasing in size. As long as he can remember he has had a number of pigmented spots on the skin of his thorax and thinks that similar spots have developed recently on his abdomen He admits having had gonorrhea many years ago but denies having had syphilis

Physical examination shows the patient to be chronically ill and apathetic in appearance. There is some question as to the presence of a slight jaundice His teeth are in poor condition and there is one firm, slightly enlarged lymphatic node on the right side of his neck immediately above the clavicle His abdomen is well relaxed and the liver edge is readily palpable 3 inches below the costal margin In the midline of the epigastrium there is a very firm nodular moderately tender mass, presumably arising from and involving the left lobe of the liver. The edge of the spleen is readily palpable three to four inches below the costal margin, but it is neither tender nor unduly firm The presence of free fluid within the peritoneal cavity cannot be diagnosed There are no other masses or abnormal findings within the abdomen

The patient's blood count shows 3,500,000 red blood cells, 45 per cent hemoglobin, 7000 white blood cells with 75 per cent polynuclears and no malarial parasites. The icteric index is 9, and the van den Bergh tests are negative both direct and indirect His blood chemistry is normal, the Wassermann is reported anticomplimentary A radiographic examination of the gastro-intestinal tract shows no lesion His rectal examination is normal

Because of the patient's history, the physical findings and the presence of the multiple pigmented areas on his skin, a preoperative diagnosis of malignant involvement of the liver was made, and an operation in the nature of a biopsy procedure was performed

Upon opening the abdomen, the left lobe of the liver was found involved by a single large nodular tumor mass situated deeply within the liver substance and apparently malignant in nature. A second smaller, also apparently malignant, nodule was present on the anterior surface of the left lobe of the liver, and two other similar nodules were palpable on the under surface of the left lobe of the liver The nodule on the anterior surface was removed for diagnosis. The right lobe of the liver was not palpated because the exploratory incision was to the left of the round ligament of the liver. The spleen

was found uniformly enlarged, approximately five to six times the size of a normal spleen, and was adherent to the parietal peritoneum, by many friable adhesions. In several areas the consistency of the spleen felt more firm than elsewhere, but these areas were not elevated above its surface and hence did not impress one as representing neoplastic change. Following the removal of the specimen from the liver for diagnosis, the abdominal wound was closed without drainage and healed by primary union. The patient's convalescence was protracted by persistent fever, averaging 101° F., for which no cause was found. The pathologic report on the excised specimen was "healing gumma."

After leaving the hospital, the patient was referred to his physician who continued the administration of potassium iodide which had been instituted shortly before the patient's dismissal from the hospital. Although eight months have elapsed since operation, the patient has returned to good health, has gained 15 pounds in weight, and his physical examination fails to reveal any abdominal mass or other evidence of progress of the disease.

The particular interest attaching to this patient's findings adheres in the fact that the involvement of the liver seemed particularly confined to the left lobe, said to be common in gummatous involvement. Furthermore, the exceedingly close mimicry of malignant disease should support a plea for exploratory and diagnostic operation in every instance where this course is at all practicable.

POSTOPERATIVE EVISCERATION

ONE of the most serious complications arising after an abdominal operation is the rupture in part or in entirety of the sutured wound. Fortunately such complications are of unusual occurrence, but when they do develop there is usually present the added feature of wound infection. It is questionable whether or not a well sutured, uninfected abdominal wound ever breaks open, although the possibility of such an accident must be admitted. In the presence of infection, one naturally hesitates to reopen an abdomen widely for the purpose of resuture because of the danger of peritoneal involvement. Nevertheless, that it is essential to face this danger and to resuture the abdominal wall completely so as efficiently to control the evisceration is illustrated by the following case.

Mrs. J C. had had four abdominal operations and was not clear as to the exact nature of any one of these procedures. Her last laparotomy took place eight years ago and she states that she first noted a protruding mass at the site of the scar three weeks later. This hernia had been present ever since, but had caused no undue symptoms until the six weeks previous to admission to this hospital. During this time the mass increased in size and she experienced cramplike abdominal pains with occasional attacks of vomiting

Physical examination showed a protruding postoperative ventral hernia through a scar in the left lower abdomen Palpation revealed a circular defect in the abdominal fascia or scar tissue about the size of a silver dollar Operative repair of this hernia was undertaken and the defect was closed without undue difficulty with four mattress sutures of kangaroo tendon overlapping the entire thickness of the abdominal wall from side to side The overlapped wall was sutured to the underlying abdominal wall in the usual manner and the skin wound drained

Postoperatively the patient had a rather persistent cough, but otherwise seemed to be making a smooth convalescence The wound was dressed every forty-eight hours On the eighth postoperative day one loop of small intestine was found to be protruding from the skin margins The patient was taken to the operating room immediately and anesthetized with a view of resuturing her wound However, as only a small defect was found through which this loop of intestine had protruded, and as the wound itself showed little, if any, evidence of inflammatory change the intestine was replaced and an effort was made to retain it by packing with vaselin gauze and the applica-

tion of firm adhesive strapping. Twenty-four hours later several loops of small intestine were discovered protruding from her wound and it was necessary to anesthetize her for the third time. Upon this occasion the entire wound repair was found to have given away. It appeared as though the small defect of the preceding day had served as the opening wedge for the complete disruption of the wound. Resuture was accomplished with multiple sutures of heavy silk inserted to include all the thickness of the abdominal wall except the skin and subcutaneous tissues which were allowed to remain completely unsutured. Recovery from this last procedure was extremely stormy, but in the end fortunately satisfactory, and the patient was dismissed from the hospital fifty-nine days later.

BILIARY LITHIASIS

THE following case is presented so that its findings may be correlated with those of a somewhat similar case reported in the *Surgical Clinics of North America*, June, 1929. By referring to the former report, it will be noted that the absence of gallstones in that patient's gallbladder throughout his life was never definitely proved. Here, however, is a case with a distended, thin-walled gallbladder in which it is known that there were no calculi within the viscus.

The present patient is an aluminum smelter worker, fifty-nine years of age, referred to the hospital with the complaints of constipation and right upper abdominal pain of four months' duration Both of these symptoms appear to have begun coincidentally, but the pain was relieved by bowel movements His attention was called to jaundice of his skin about two months before his admission and since this time he thinks that its intensity has varied from day to day. He has never been deeply jaundiced, although he has noticed clay-colored stools and dark colored urine There is no history of chills, fever or sweats, nor of any severe illness prior to the onset of the present one Another prominent feature of his history is marked loss of weight.

Physical examination showed the patient to appear chronically ill, considerably emaciated, but only moderately jaundiced His abdomen was symmetrical in contour and not distended. The presence of free fluid could not be determined but in his right upper quadrant there was a definite sense of resistance. This resistance was interpreted as an enlargement of his liver, and although no nodules or irregularities could be felt, the concensus of opinion was that the liver enlargement probably represented a malignant involvement. Roentgenographic examinations of his gastro-intestinal tract and visual examination of the rectum showed no lesion

The patient was operated upon under the preoperative diagnosis of either carcinoma of the liver or a similar lesion in the head of the pancreas obstructing his common duct. Under general anesthesia palpation of his right upper abdomen showed the resistant area to be softer in consistency than one would have expected from liver tissue, but even with this observation the existence of a distended gallbladder was not diagnosed

Upon opening the peritoneal cavity there was found a small quantity of clear amber colored fluid in the right upper abdomen and a greatly distended gallbladder. The liver itself was found to be moderately enlarged; its free edge was rounded and evident fibrous tissue was present in its substance There were no nodules or other findings suggestive of carcinoma. The head of his pancreas was normal in size and consistency. The distention of his

gallbladder continued to and involved the cystic duct, the diameter of the latter being approximately ¾ inch. Within the common duct immediately distal to the junction with the cystic duct was found an impacted calculus about ¾ inch in diameter. The common duct distal to this calculus was of *normal size, but the hepatic duct proximal to the calculus was greatly dilated.* Within the hepatic duct were found two additional calculi. Within the distended thin walled gallbladder and cystic duct was a light brownish colored fluid resembling liquid fecal material but without odor. Culture of this fluid showed colon bacilli. There was not a single calculus within the gallbladder or cystic duct. *Along the course of the common duct were two enlarged* and apparently inflammatory lymphatic glands. The calculi which were present within the ducts were soft and crumbled readily upon pressure, thus resembling pure pigment calculi. In addition to these calculi the ducts also contained some granular sandlike material. The procedure consisted in an exposure of the above findings, identification of the common duct calculus, and an incision into the common duct. The obstructing common duct calculus was readily removed and a vertebrated probe then passed through the duct well into the duodenum without difficulty. The two calculi within the hepatic duct and the sandlike material were removed.

The question as to the advisability of cholecystectomy (which would have been quite simple) now arose. The decision against this procedure was based upon the findings in the case to which reference has already been made. In that instance, it is highly probable that a calculus or perhaps several calculi within the ducts were overlooked at the time of the cholecystectomy, but certainly not the enormous accumulation of calculi which were encountered less than two months later at the second laparotomy. Furthermore, the postoperative discharge, through the drainage tract, of great numbers of calculi which appeared as accurate casts of the smaller biliary ducts led to the conclusion that the gallbladder removal had brought about some change in the system which hastened the formation of these stones. The theory was advanced that, while present, the gallbladder may have acted as a preventive factor in the formation of ductal calculi either by virtue of some secretory activity of its mucosa or by maintenance of some balance of the pressure relations within the biliary system. Drainage of the gallbladder itself was certainly indicated, but it was felt that such drainage would take place most efficiently by way of the dilated and incised cystic duct and that the addition of a drainage opening through its fundus was unnecessary. Therefore soft rubber drains were introduced to the neighborhood of the common opening within the cystic and common ducts and the abdomen closed in its anatomical layers. No tube drainage was employed.

Postoperative convalescence was unusually smooth and the presence of bile within the intestinal tract was evidenced by the color of the patient's stool forty-eight hours after operation.

PARONYCHIA

It is perhaps not too great an exaggeration to state that the general surgeon is prone to center his attention upon the major surgical conditions and to give less thought to the treatment of the apparently minor lesions. The latter, however, are likely to be of major importance to the patient; occasionally are potential forerunners of serious complications; and should and frequently do call for the exercise of an equal amount of judgment. Hence it does not seem ill advised to take up, at this time, the proper handling of infections involving the paronychium and the eponychium.

Probably the most common error made in their treatment is an incision into the soft parts. Such an incision is seldom if ever called for. The infection almost invariably arises as the result of a break in the cuticle and before it has extended beneath the nail adequate drainage can be obtained simply by retraction of the soft parts from the nail at each daily dressing. This drainage will be greatly facilitated by the use of a hygroscopic dressing—such as pure glycerin. A frequent pitfall in the success of this treatment is the too early discontinuance of the glycerin dressings so that insistence upon the patient's daily return for at least two or three days after the process is apparently cured cannot be too strongly stressed.

As soon as the infection has extended to involve the nail matrix the nail root is loosened and raised and becomes a foreign body in the suppurating area. The earlier this diagnosis is made and proper treatment instituted, the less likely will be permanent damage to the nail matrix and the more likely will be the regeneration of an undeformed nail. By careful examination the looseness of the nail root may be determined and often there may be seen the presence of purulent exudate beneath the lunula. The indication then is for the removal of the foreign body with the least amount of injury to the matrix Entirely

adequate drainage will be obtained by this course alone and no incision into the soft parts will be found necessary. In many, if not the majority of instances, only a portion of the nail matrix is infected and the temptation to remove only that segment of the nail root is great. This accomplishes nothing as far as the rapidity of healing is concerned, for the entire nail will regenerate as quickly as any part of it Thus the most satisfactory outcome will result from the removal of the entire proximal third or half of the nail.

To accomplish this, inhalation anesthesia is the most satisfactory, although it is probably permissible in many instances to use novocaine nerve block anesthesia in the proximal phalanx of the involved finger There is no excuse for freezing anesthesia by the ethyl chloride spray and its use should be definitely discarded. A tourniquet should be applied to the base of the finger so that the procedure may be carried out in a bloodless field. With fine artery forceps the proximal portion of the nail can be raised from its bed, gently rolled distally to the extent desired, and divided transversely with scissors It is important not to explore beneath the eponychium for the removal of any nail root that may appear not to have come away since such trauma may so injure the matrix as to result in a deformed nail. Subsequent daily, bland and nonirritating dressings are all that are needed to bring about a satisfactory termination of the process

ANTERIOR SUBGLENOID DISLOCATION WITH FRACTURE OF THE GREATER TUBEROSITY OF THE HUMERUS

THIS patient, M. M., white female, age thirty-nine years, slipped on a tile floor injuring right shoulder. Physical examination, three hours after the accident, showed the head of the humerus to be palpable anterior and beneath the glenoid, any motion of the arm associated with severe pain and the contour of the shoulder showed a marked depression beneath the acromion

Fig. 203.—Preoperative *x*-ray showing anterior subglenoid dislocation of the shoulder with fracture of the greater tuberosity of the humerus

x-Ray examination (Fig. 203) showed a fracture of the greater tuberosity with the dislocation as above stated

Routine urinalysis showed four plus albumin with a large number of pus cells. Medical examination before anesthesia showed a reduplication of the

cardiac sounds, slight arrythmia but no murmurs and nothing to contra-indicate anesthesia or immobilization

Under gas anesthesia, good muscular relaxation was obtained Reduction by means of the Kocher method was apparently successful, the normal contour of the shoulder being restored Following this, a large pad was placed in the axilla holding the head of the humerus well to the superior and posterior portion of the joint and thereby obtaining greater protection for the

Fig 204.—Postoperative x-ray showing result of reduction

torn portion of the capsule A spica was applied in this position, the arm being placed in moderate abduction and the shaft of the humerus at a right angle to the spine of the scapula

Postoperative x-ray (Fig 204) showed satisfactory reduction

Cast was left on for three weeks following which the arm was placed in a sling and physiotherapy given She was able to return to work in five and a half weeks after the accident and her convalescence was uneventful

Comment.—In handling these cases the most important factor considered is accurate reduction The use of a large pad in the axilla gives greater protection to the joint and aids in the

repair of the torn capsule, and I believe that many cases of habitual dislocation of the shoulder could be avoided if this routine were followed. There is a diversity of opinion as to the time of immobilization, but I believe that the cast should be left on for at least two weeks in any case.

FRACTURE OF THE NECK OF THE ASTRAGALUS

THIS patient, H. L., was injured by falling from a ladder, and when brought to the hospital complained of pain in the lumbar region of the spine, with slight swelling and extreme pain over the right ankle.

Local examination of the right foot showed limitation of motion, exquisite tenderness over the anterior surface of the neck of the right astragalus, severe pain on pressure over the internal malleolus, particularly the distal portion. Eversion of the foot caused marked pain over the internal lateral ligaments; also exquisite pain on palpation over the scaphoid.

Fig. 205.—Anterior, posterior, and lateral views, showing fracture of the neck of the astragalus with slight fracture of the scaphoid.

x-Ray examination (Fig. 205) showed a fracture of the neck of the astragalus with slight upward displacement of the distal fragment, also a fracture of the scaphoid. In addition to this, there was slight compression fracture in the region of the tenth dorsal vertebra, which responded to treatment by immobilization.

In reducing this fracture, the foot was first plantar flexed in order to bring the distal fragment in line with the proximal one. Following this, the entire foot was rotated in dorsal flexion to within 10 degrees of a right angle, and a cast applied

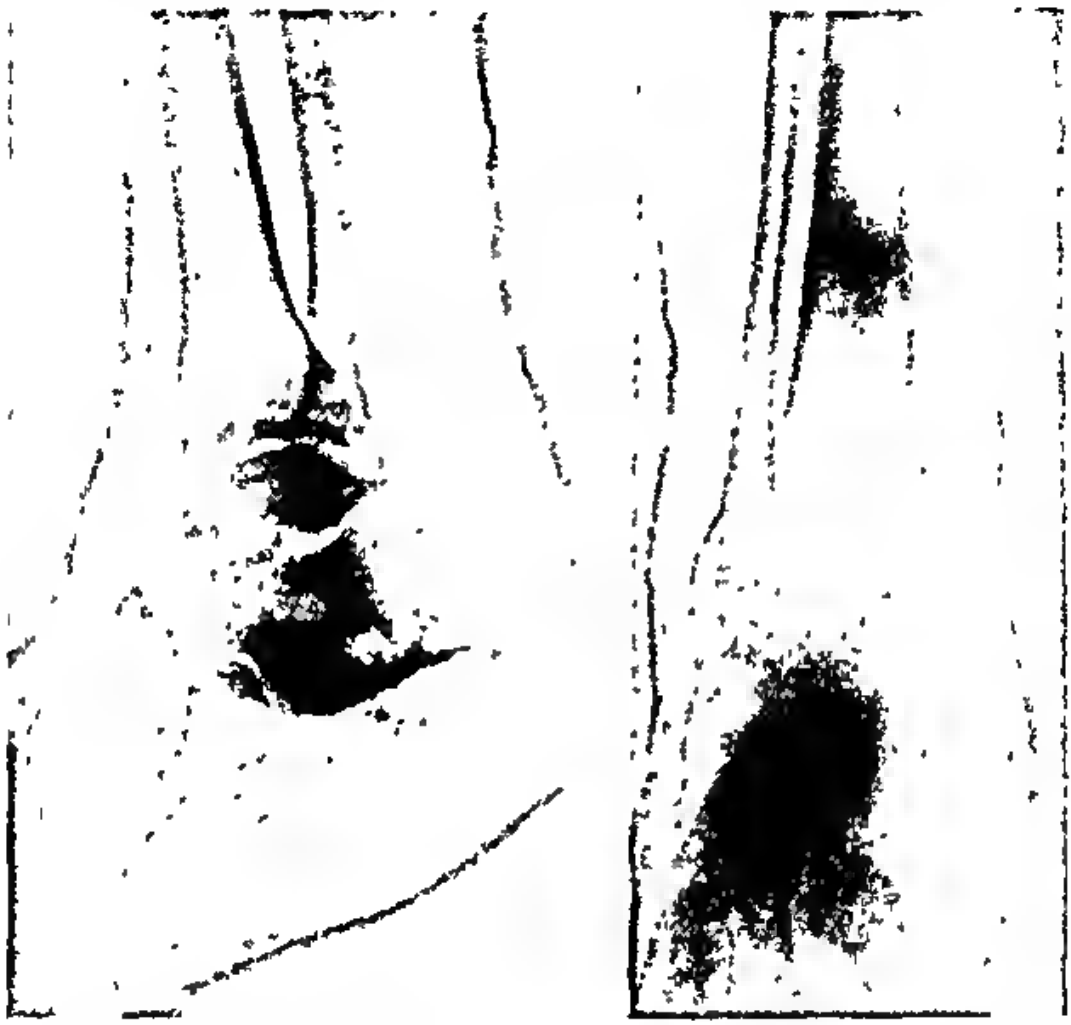


Fig 206.—Anterior, posterior, and lateral views, showing result of reduction

This position was changed at the end of three weeks and a new cast applied, with the foot at a right angle.

Postoperative x-rays are shown in Fig 206

Total time of immobilization in this case was ten weeks when x-ray examination showed firm union and physiotherapy was given

COMPOUND FRACTURE OF THE FEMUR WITH FRACTURE OF THE PATELLA AND SKULL

THE patient, G. G., colored, male, age thirty-eight years, laborer, was hit by a 500-pound weight on June 14, 1929, knocking him down and resulting in the above fractures. He was brought to the hospital by an ambulance in a condition of shock, and treatment given immediately. Physical examination showed a large area of ecchymosis over the left frontal region, preternatural mobility of the middle third of the left thigh with a compound fracture in

Fig. 207.—Lateral view showing overriding of the fractured femur with fracture of the patella.

Fig. 208.—Lateral view showing malposition and overriding, after reduction on the fracture table.

this region, a portion of the bone protruding from the lateral aspect of the thigh. Examination of the left knee showed slight separation and signs of fracture of the left patella. After initial treatment for shock, the entire left thigh was carefully cleaned with benzine, shaved and then painted with iodine. Three and a half per cent iodine in a chemical blood syringe was forced through the opening in the skin in an endeavor to thoroughly sterilize

the area of the compound fracture, and a large dressing placed over it. The patient was then placed in a Thomas splint and emergency x-rays taken which showed a compound comminuted fracture of the middle third of the left femur and a fracture of the left patella without marked displacement (Fig 207). Consultation with Dr William Sharpe regarding possible cranial injury was then held and the fracture of the skull treated by him.

On June 21st, the patient had sufficiently recovered from his cranial injury to further treat the fracture of the femur. After removing the Thomas splint and giving him a spinal anesthetic, he was placed on the Albee table and traction applied Under strict aseptic precautions, the spicule of bone was removed from the seat of the compound fracture, culture taken from the

Fig 209

Fig 210

Figs 209, 210.—Postoperative x-rays taken eight weeks after sliding graft Note large amount of callus

wound and the wound closed Traction in abduction was applied and an effort made to secure end-to-end apposition of the fragments Good muscular relaxation was obtained by use of the spinal anesthetic While the patient was still in
third of th
entire left
through the plaster in such a way as to permit traction to be applied to it The cast was carefully molded over the symphysis and tuberosity of ischium

and also the condyles of the femur. When the patient was removed from the table, skin traction of 30 pounds was applied.

In spite of this, postoperative x-rays (Fig. 208) showed poor reduction with overriding of the distal fragment Traction was increased to 47 pounds without correcting the deformity There was no separation of the fracture of the patella, and the cranial injury made satisfactory progress. Open reduction was decided on to correct the fracture of the femur, and we felt that we were justified in regarding the case as being clinically free of infection for the following reasons:

1. Preliminary treatment had been carried out most carefully.
2. There had been no temperature reaction
3. Negative culture from the wound when reduction was first attempted

The exact type of operative work to be done would be determined after careful examination of the wound at the time of operation. I felt that if there was any foreign material or any possibility of infection from a macroscopical examination, that end-to-end apposition with suturing of the bone ends with fascia lata would be indicated If there were no signs of infection, I was prepared to do a sliding graft from the proximal fragment of the femur

A lateral incision was used and as there was no sign of infection, a sliding graft, after the method of Albee, was done.

Postoperative x-ray showed satisfactory reduction and the patient made an uneventful recovery with most satisfactory callus formation.

The cast was removed in about eight weeks and massage and physiotherapy given to the leg, especially to the knee The knee had to be kept in extension during this period of about ten weeks with the result that there was a great deal of stiffening of this joint It was manipulated on October 7, 1929, under spinal anesthesia, and we were able to secure 80 degrees of motion. The patient was able to bear weight and made a satisfactory convalescence.

Comment.—I believe that the use of a sliding graft in a fresh fracture is slightly radical and should not be done without most careful consideration of the individual case. In selected cases, its use is indicated and will reduce the time of convalescence and obtain a much better end-result

It is also of interest to note that although this patient had a four plus Wassermann blood and spinal fluid, which was determined by the routine examination at the time of admission, through a clerical error, antisyphilitic treatment was delayed and in spite of this the amount of callus formation was exceptionally good. This is in contrast to the teaching that syphilis is often a cause of nonunion.

CHRONIC OSTEOMYELITIS OF TIBIA WITH PATHOLOGIC FRACTURE

THE patient, M. D., male, age fifteen years, was first seen by me at the request of Dr. C. P. Hussey on June 6, 1927. At that time he complained of discharging sinuses over the anterior portion of the distal third of the left tibia. He gave a history of having had acute pain in the above mentioned region of the leg eighteen months previously. This was sharp in character,

Fig. 211.—Showing large area of destruction with a pathologic fracture.

temperature up to above 103 F., *x*-ray examination, however, being negative. Four days after the onset of symptoms, an exploratory operation was done and a large amount of pus was drained from an area of osteomyelitis of the left tibia. No radical work was done, the operation being only incision and drainage. From that time, he had had fifteen operations which consisted of removal of sequestra and drainage of the infected area, without relief—the discharge persisting during the entire time.

Physical examination showed the left foot to be in a position of talipes equinus with four large sinuses, two on the anterior surface of the lower third of the left tibia, and one on each side in close proximity to the internal and external malleoli. On judicious probing these were found to be connected with a large area of rarefaction of the tibia.

x-Ray examination (Fig. 211) of July 5, 1927, showed typical chronic osteomyelitis with large areas of necrosis and a pathologic fracture about ½ inch above the distal extremity of the tibia.

Fig. 212

Fig. 213

Figs. 212, 213.—*x*-Rays taken before radical operation showing marked improvement as compared with *x*-rays in Fig. 211.

These x-rays show that the original involvement appears to follow the course of the nutrient arteries as described by Wilensky.[1]

Careful *questioning failed to reveal any trauma which might* have accounted for the pathologic fracture. Amputation had been advised by several doctors, and the patient and his family were given a poor prognosis.

He was operated on July 7, 1927. The entire lower third of the left tibia was found to be markedly decalcified with many sequestra. The condition

[1] Annals of Surgery, November, 1926.

of the bone from gross and x-ray examination was such that radical operative work, in my opinion, would have resulted in a complete collapse of the tibia with disastrous results All four sinuses described were found to communicate with the medulla. A slight débridement was done with wide incisions over the anterior portion of the tibia and drainage to either side through the two communicating sinuses. Four Dakin tubes were inserted at the completion of the operation, and a posterior splint was applied to prevent further de-

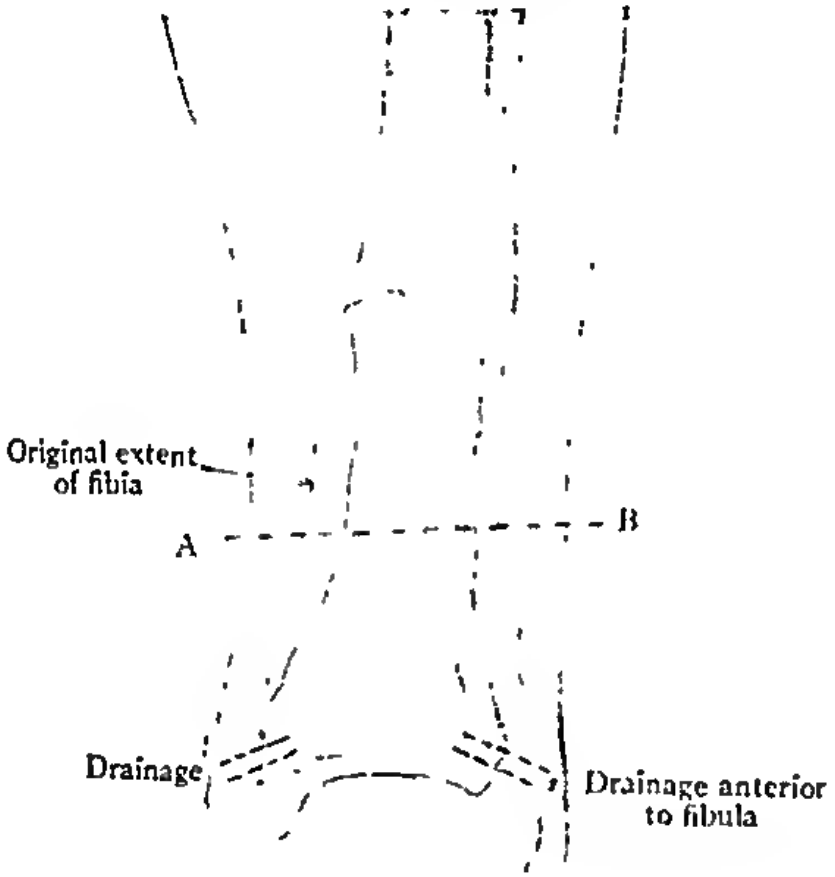


Fig. 214.—Diagram showing extent of operation.

formity of the foot. Oil silk was placed around the Dakin tubes to prevent soiling of the area when Dakin's treatment was being carried out.

The treatment was continued in the hospital and later at home until April 13, 1928. x-Rays taken at this time (Figs. 212, 213) showed a marked improvement in the condition, and it was felt that there had been sufficient bone repair to warrant radical operative work.

Operation, April 14, 1928 The entire leg was prepared, a tourniquet placed on the middle third of the left thigh An incision was made over the anterior surface of the left tibia, exposing the entire diseased area The necrotic bone was removed extending to within 1 cm of the cartilage over the lower articular surface of the tibia The edges of the wound were carefully saucerized, and the discharging sinuses on the lateral and medial sides of the tibia thoroughly curetted (Fig 214) The entire operative area was then cleaned with 3½ per cent iodine and packed with vaselin gauze which covered

Fig 215 —x-Rays taken January 21, 1929

the area of bone removed and was brought through the two old lateral sinuses A circular plaster case was applied, the treatment following the method of Orr

The Pathologic Report of the Tissue Removed Follows.—*Gross*.—Specimen consists of many pieces of chipped bone and a few ragged pieces of fibrofatty tissue The largest piece of bone measures 5 5 × 3 × 1 2 cm In the midportion of this large piece is what appears to be a sinus containing very firm fibrous tissue and yellowish purulent material

Microscopical.—Various sections of the soft tissues show old and new granulation tissue markedly infiltrated with numerous polymorphonuclear leukocytes, plasma cells, and large endothelial cells A few phagocytes con-

taining blood pigment are present. Scattered here and there are a few spicules of bone.

Postoperative convalescence was uneventful The cast became very much soiled and the odor most offensive; when it was removed on May 3d, it was found that pus had caused an ulceration of the entire skin on the posterior surface of the leg; the wound, however, was in excellent condition, with health granulating tissue except in the most distal portion, where there was still roughening of the bone After removing the cast and thoroughly cleaning the leg and packing as before, large quantities of aristol were applied between the layers of vaselin gauze and the gauze carried around the entire leg from the knee to the toes. This was done in an effort to prevent further ulceration of the leg and was repeated at subsequent changes of the cast This change in the technic resulted in marked improvement in the condition of the skin The period of changing the cast was usually from three to five weeks In the interval, the tonsils, which were moderately diseased, were removed, following which, the general condition of the patient improved greatly

After the patient was discharged from the hospital and the cast removed, it was necessary to keep a dressing over the wound In this case we used vaselin gauze with a bandage to hold it in position, and the vaselin gauze was changed only every three to five weeks, the outer dressing being changed more frequently, depending on the amount of discharge On July 7, 1929, there was still an unhealed area in the lower portion of the wound and the foot was still in a position of talipes equinus. It was decided to correct this deformity and at the same time thoroughly curet the sinus in an endeavor to get a complete cure. In doing this, it was realized that the lengthening of the tendo achillis in a clean field and at the same time operating on an infected sinus would require great care to prevent infection of the first wound

At operation, the entire leg except the infected sinus was prepared with iodine. This area was then cleaned with iodine and thoroughly packed and covered with rubberized silk held in place by towel clips The area of operation over the tendo achillis was then painted with iodine the second time and the tendo achillis lengthened after the method of Hoke This permitted bringing the foot to a right angle A large pad was placed over the area of operation and held in position by towel clips The sinus was then operated on, the skin and fibrous tissues being removed No true sequestra were found and the failure of closure was probably due primarily to the soft tissues being unable to completely fill the deep cavity in the bone After thorough packing of the cavity a cast was put on with the foot at a right angle.

On removing the cast, the operative area over the tendo achillis was found to have healed by primary union, and the sinus was granulating satisfactorily, the patient was allowed to carry on in the usual manner, a small dressing being kept in place for several weeks This healed completely and the patient has had no further trouble.

Comment.—In this case which illustrates extreme destruction of bone in chronic osteomyelitis, the question of amputation was considered most carefully. The total length of treatment

was about two years, but the end-result would seem to warrant the procedure carried out. There is no doubt that initial treatment at the time of acute onset was somewhat delayed, which would doubtless account for the severity of the condition. The fifteen operations which were apparently of palliative nature, could not have been expected to get a satisfactory result.

The Orr treatment lessens the period of hospitalization and improves the prognosis in these cases.

PATHOLOGIC FRACTURES

THE purpose of this study is to review conditions predisposing to pathologic fractures with a percentage of their occurrence in certain series of cases and a few observations which may prove of interest in the study of osteogenetic repair in normal and pathologic conditions.

Pathologic fractures are caused by a solution of continuity of osseous structures predisposed thereto by:

1. (*a*) Disease primarily involving the bones.
   (*b*) Extension to the osseous tissue occurring in systemic diseases.
2. Local infective or inflammatory processes.
3. (*a*) Secondary skeletal carcinomatosis.
   (*b*) Benign and malignant primary bone tumors.

The history of these cases characteristically reveals varying degrees of trauma, although in many instances fracture may occur from so slight an exertion as a misstep in walking or as a result of moving around in bed, the bone being so weakened by the pathologic condition that it is unable to bear even mild stresses and a very slight movement may produce fracture.

GROUP I

(*a*) One of the most interesting of the first group of cases is the multiple fractures that are frequently reported in *fragilitas ossium*, sometimes known as *osteogenesis imperfecta*. Cases have been reported in which multiple fractures have been present at birth The condition is frequently noted from about the ninth month to the second year when the child is beginning to walk, or later, from the sixth to the fourteenth year, following physical exertion. These patients are usually frail, poorly developed physically and the blue color of the sclera is considered a significant sign. Of the cases that came under personal observation—one was seven and a half years of age and had fractures

embryonic tissue followed later by laying down of new bone in the fibers of the callus. As the process in the latter case is necessarily longer, the chances of nonunion would be accordingly increased.

If we consider the highly specialized osseous structures, for example, in the neck of the femur or in the spinal column, we find that the osteoblasts are laid down to conform with the direction of greater stress, hence, in fractures occurring in these regions, there first must be a return to the primitive condition of the bone and callus formation and new bone formed after this has taken place. Hence, the more specialized the bone, the greater its mechanical value but its osteolysis to primitive tissue would be necessarily slower and hence the period of immobilization and the time of osteogenetic repair accordingly increased. This is in strict accord with the theories of Leriche

In one of the most highly specialized regions of the body, namely, the lumbar spine and pelvis which nature is endeavoring to strengthen so as to more adequately provide for carrying the entire weight of the body on the posterior limbs, we find, from the work of Willis, that separation of the neural nrch did not result in any callus formation in the specimens studied, although 3.8 per cent of these specimens showed such separation.

In the pathologic fractures observed in Paget's disease, the writer has never seen a case of nonunion, and many of them nre firmly united well within normal time limits. The observations above described would apply here as well as in rickets in which fractures usually repair by hard, dense callus, in both these conditions a marked decalcification being present.

The treatment of rickets has been quite carefully worked out and the roll of calcium and phosphorus metabolism is more fully understood, hence, therapy on this basis has resulted in an improvement in our handling of this disease. Osteomalacia is similar to rickets except that it occurs in persons whose ossification is complete. It is frequently seen in adults, particularly in women during pregnancy and lactation.

Dr. Paul Martin of Lousanne, Switzerland, reported 2 cases of pathologic fracture occurring in osteitis rarefiante carieossium

in workmen employed in match factories where a large amount of phosphorus was handled

One case in which the patient exhibited slight acromegalic characteristics was studied by the author. This patient had six pathologic fractures but they repaired by hard callus formation within normal time limits

(*b*) **Extension to the Osseous Tissue Occurring in Systemic Diseases.**—*Syphilis* In acquired syphilis, differential diagnosis should be made between

1. Syphilitic gumma in the bone.
2. Syphilitic periostitis
3. Osteoporosis, general fragility of the bone without gumma.

In congenital syphilis, most frequently called syphilitic osteochondritis or Parrot's disease, we frequently have slipping of the epiphysis The repair in these cases varies with the lesion which is a causative factor

Diseases of the nervous system are also included in this group. The occurrence of pathologic fractures in cases with tabes dorsalis is fairly frequent, Speed having reported 12 to 15 cases each year in the Cook County Hospital. They usually occur in the long bones near the joints, are painless and accompanied by bone changes of a rarefying or hypertrophic character. Occasionally, such a fracture is the first indication of a parasyphilitic condition

One of the most interesting and rare conditions in which pathologic fractures occur is syringomyelia. A review of the literature by Alajouaine, Maurice, and Camus[4] included 18 cases besides the one which formed the basis of their article. The typical fracture in this disease involves the upper extremities but may affect any bone. When multiple fractures occur, they are usually symmetrical Very slight trauma is sufficient to cause them. These fractures are chiefly indolent, a swelling or muscular pain frequently being the first symptom; these may be pronounced and may be associated with extensive ecchymosis The *x*-rays usually show a rarefying bone process They tend to union, but ordinarily with irregular bone proliferation. A probable explanation of their frequent occurrence in the upper

extremities is that this disease principally involves the cervicodorsal medulla. Comparatively few studies have been published on the mechanism of spontaneous fracture in syringomyelia. Charcot was the first to point out the fact that they were due to trophic disturbances. In one of these cases personally observed, the fracture involved the acromion. Repair was markedly delayed.

A most interesting case of pathologic fracture occurring in Malta fever has been reported by Cuagrecases and Tornel.[5] The patient suffered complete bilateral fracture of eight ribs, caused by merely moving in bed. Because of the early death of the patient, healing was not completed.

GROUP II. LOCAL INFECTIVE OR INFLAMMATORY PROCESSES

Pathologic fractures occurring in cases of osteomyelitis are relatively common and depend for their repair on the treatment of the primary condition. The Orr treatment has revolutionized the prognosis in this disease, and in the case reported later, the fracture had repaired before the osteomyelitis was completely checked. Since tuberculosis primarily involves the joints, when fractures are observed, they are usually in close proximity to the joint, the diaphysis being involved secondarily

GROUP III. SECONDARY SKELETAL CARCINOMATOSIS

Primary carcinoma of the osseous structures is relatively rare. Roux of Lousanne, however, has reported pathologic fractures occurring in primary carcinoma of the bone which he found in epidermal tissue of fistula overlying the bone. Metastases in secondary skeletal carcinomatosis may be carried either through the blood stream or by way of the lymphatics. The importance of the fascia in the latter has been shown by Handley[6] who found that in early cases of carcinoma of the breast, 13 per cent showed involvement of the bone. In one case observed by the author in which a very early carcinoma of the breast was radically removed by Dr. John F. Erdmann, the patient, three months later, showed secondary involvement of the entire spine and pelvis Kauffmann examined 34 cases of carcinoma of the

prostate and found the lumbar vertebrae involved in 19, the ribs in 19, the sternum in 12 and skull in 11. According to this writer's observations, spontaneous fracture is frequently the first finding in prostatic tumor Carcinoma of the thyroid was found by Lenzinger[7] as a cause of secondary metastasis in the bone in 37 per cent of his cases. Dr. Loche MacKenzie reported a most interesting case of pathologic fracture of the vertebrae due to secondary carcinoma from malignancy of the thyroid.

Speed regards such metastasis as being of a miliary type carried by the blood stream and deposited in the bone marrow. There is a relatively small number of complicating spontaneous fractures in comparison with the number of these metastatic growths. This may be explained by the fact that there is a compensatory periosteitis of a proliferative type, the extreme destructive lesions found in primary bone tumors not usually occurring Union frequently is obtained without difficulty, even though the patient dies of the disease later. Only one case of nonunion was reported by Hawley in 8 cases studied. The above finding, although in a small series of cases, is of special interest in view of a much smaller percentage of union in primary bone tumors.

BENIGN AND MALIGNANT PRIMARY BONE TUMORS

Giant Cell Tumors (Benign Myeloid Sarcoma).—This tumor usually occurs in the epiphysis of the long bones and results in an excavation of the cancellous tissue but bone proliferation occurs as the tumor enlarges Pathologic fracture is common in the above condition especially in the weight bearing bones, and if the central portion of the bone is involved, spontaneous fracture may be the first symptom. The most common locations are the lower end of the femur, upper end of the tibia and the lower end of the radius.

Coley[8] reported pathologic fractures in 9 cases out of a series of 36 In this series, the percentage of union was larger than with any other primary bone tumor. Seven of the nine achieved union It has also been noted clinically that fractures seem to have a curative effect on this tumor. The same phenomenon has

been observed in osteitis fibrosa cystica. In one of the latter cases which was reported by the author[9] this condition was complicated by syphilis and fairly firm union was obtained in seven weeks by means of immobilization, *x*-ray, and antisyphilitic therapy. The increased vascularity following fracture may account for the apparent curative effect of the trauma.

Malignant Primary Bone Tumors.—As before noted, coarse fibered or primary bone normally present in the fetus is also found in osteogenetic sarcoma as well as in the early callus of bone repair. Ewing has observed the great difficulty in differentiating the cells of sarcoma from those observed in the healing process in fractures. He points out that after fracture, organizing blood clots are difficult to differentiate from sarcoma. In certain foci, the cells may be as abundant as in sarcoma, but their arrangement is more orderly. The organization of considerable masses of blood clot provides conditions favorable for a free growth of atypical cells.

The above observations explain the difficulty in determining the exact roll of trauma in these cases. To quote from Bradley L. Coley in his recent study.

"Interval Between Onset of Symptoms and Fracture.—The initial symptom was referable to fracture in approximately

FRACTURE AS INITIAL SYMPTOM

	Fracture with onset of symptoms Number of cases	Fracture following onset of symptoms	
		Number of cases	Average months
Osteogenic sarcoma.	4	22	12 2
Giant cell. ...	5	4	3 8
Endothelial myeloma	0	7	7 8

one fifth of all the cases (9 out of 42, or 21.4 per cent) (see Table). Symptoms preceded the fracture in all the endothelial myeloma group. Pathologic fracture initiated the first symptoms in 5 of the 9 cases of giant-cell sarcoma. In the five with simul-

taneous onset of symptnms and fracture, two occurred while walking and one while going downstairs resulting in sudden collapse and pain, the fourth followed a fall on the ice and the fifth was caused by a blow from a crank handle. Three of these were spontaneous and two followed trauma. Tumor was definitely demonstrated by examination and x-ray immediately following the fracture in these cases.

"In the osteogenic sarcomas, 4 of the 26 patients dated their trouble from the time of fracture. One boy was throwing a ball, another was skating and suddenly collapsed; a third fell from a ladder, sustaining a fracture; and the fourth fell and also sustained a fracture Two were spontaneous pathologic fractures and two followed trauma. The two spontaneous fractures were in rapidly growing tumors and the pathology showed that one was of the periosteal type and the other medullary. Histologic material was not obtained in the two traumatic cases.

"Where fracture occurred after the beginning of symptoms, the average interval between first symptoms and fracture was about one year in the osteogenic sarcoma, four months in the giant-cell tumor and eight months in the endothelial myeloma group."

As before noted, we may regard the fracture as providing suitable environment for the development of sarcoma and a small percentage of cases may originate from the organizing blood clots following fracture.

The fact that primitive bone is found in these tumors might lead to the belief that early repair of the fracture could be hoped for, however, the amount of destruction which accompanies the growth would make this difficult. In the process of osteolysis, the bone tissue reverts to its primitive condition, namely, connective tissue Following this, it again takes up its evolution and may assume new characteristics When it becomes fibrous, it may go on to the formation of fibrous osteitis, as in osteitis fibrosa cystica. If neoplastic tra [illegible] and atypical cells are formed, osteogen [illegible] the various diverse and strange fo

In one case of endotheliom [illegible]

trauma resulted in a pathologic fracture of the symphysis pubis. On account of the position of the fracture, biopsy was impossible and radiological diagnosis of endotheliomyeloma was made in about four weeks after the time of injury. In this case it was interesting to note that, as a result of *x*-ray therapy, there was a slight, though definite callus formation in the first stage of the treatment, though later, the increase in the size of the tumor and involvement of the lungs resulted in the death of the patient (Figs. 216–218). In endotheliomyeloma, spontaneous fracture is often an early symptom due to the rapidity of the growth of the tumor and the marked destruction accompanying it This is especially the case in weight bearing bones.

In multiple myeloma, fractures and deformities mark the late stages of the disease. In contrast to this, in telangiectatic osteogenetic sarcoma, the growth of the tumor and the osseous destruction result in fracture early in the disease.

It may be of interest to note the number and location of pathologic fractures found in the Registry of Bone Sarcoma. In the series of 952 cases studied, pathologic fractures were found in 76, or 7.8 per cent. The location of these fractures was as follows:

Femur	43
Humerus	17
Tibia	7
Clavicle	2
Radius	2
Fibula	2
Mandible	2
Ulna	1

It is of interest, though no definite deductions can be drawn from it, that all these fractures, with the possible exception of the mandible, occurred in the peripheral osseous skeleton and none were reported in the spine.

I am indebted to Bradley L. Coley for his analysis of 185 cases of primary bone tumor covering the work at the Memorial Hospital, New York City, for the last ten years. This showed a total number of fractures 42, percentage of frequency 22.7.

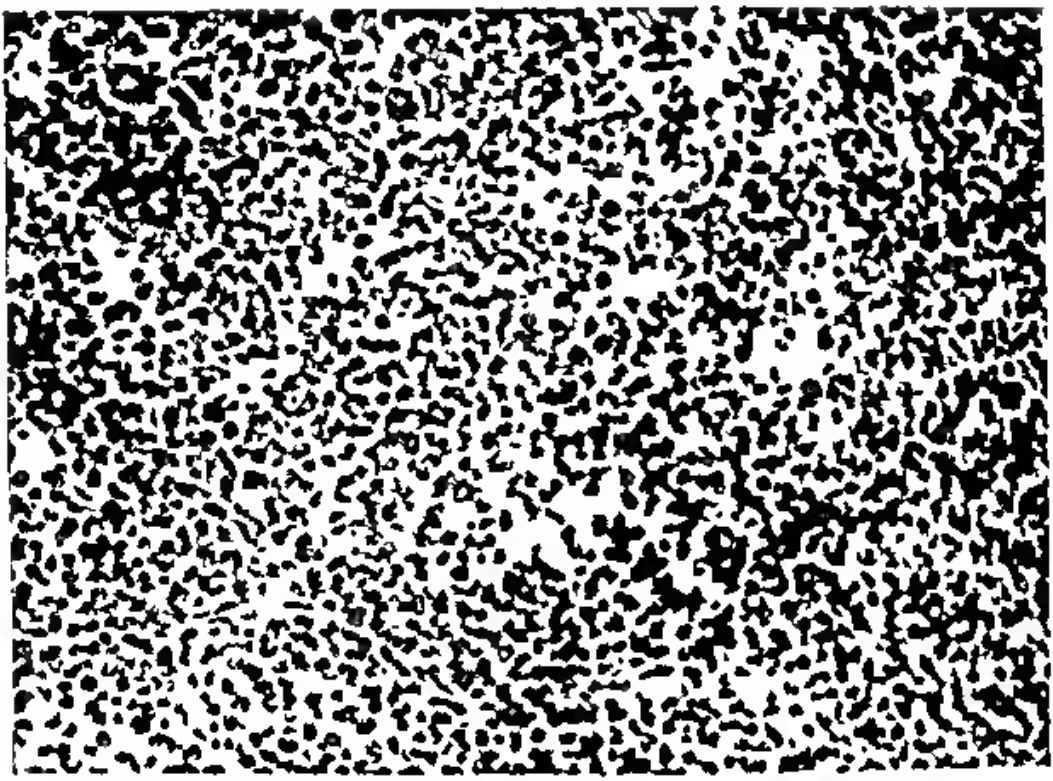


Fig 216 High power photomicrograph of primary tumor

Fig 217.—Low-power photomic · h

In 122 cases of osteogenetic sarcoma, 26 fractures were observed, percentage of frequency 21.3. In 36 giant-cell tumors studied, total number of fractures observed were 9, percentage of fre-

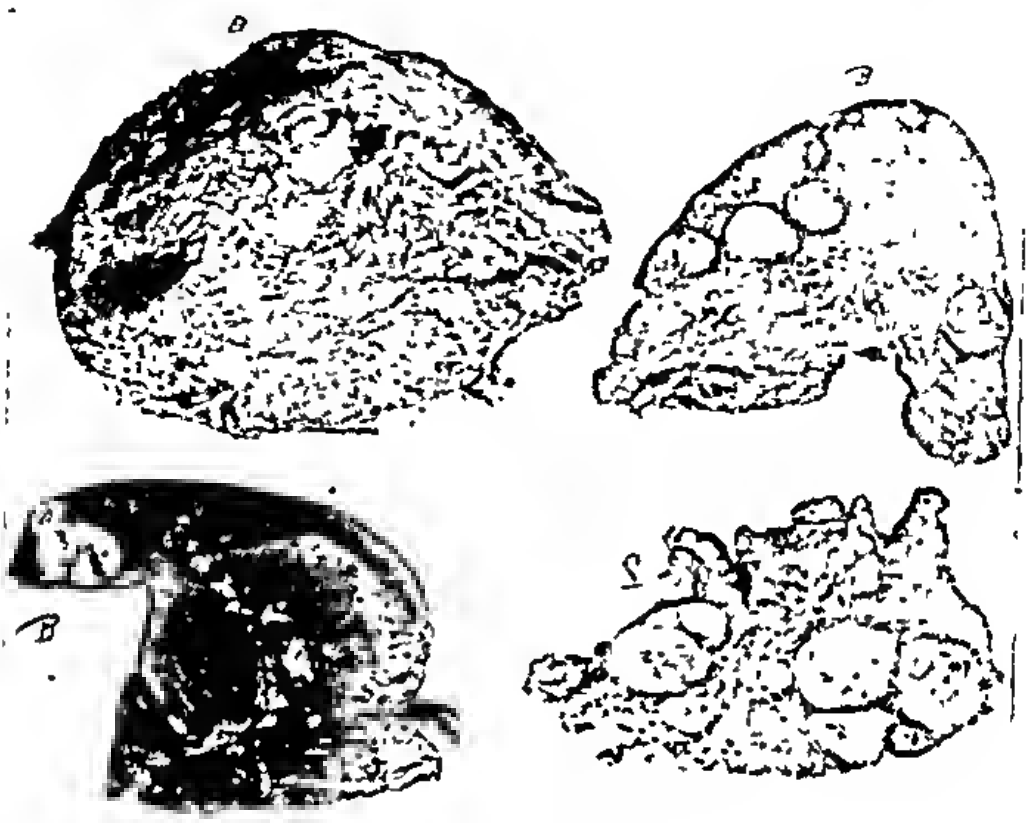


Fig. 218.—*A*, Primary tumor. *B*, Secondaries in the liver. *C*, Secondaries in the lung

quency 25. In the 27 cases of endotheliomyeloma, 7 fractures occurred in a percentage of 25.9.

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CLINIC OF DR. ARTHUR KRIDA

Hospital for Ruptured and Crippled

RECONSTRUCTION OF THE ANTERIOR CRUCIAL LIGAMENT OF THE KNEE JOINT

More than twenty years ago Sir Robert Jones taught us the symptomatology and operative treatment of injured semilunar cartilages. His writings had the effect, at least insofar as it concerns the American profession, of establishing the surgery of the knee joint on a firm and practical basis.

It was soon recognized that other and varied and extensive pathology of the soft parts of the knee joint might be responsible for chronic disability, and that a considerable portion of such cases was amenable to rehabilitation by well planned excision of such diseased structures. Swett, Ellis Jones, Fisher, Steindler, Speed, Morehead, and Krida have at various times elaborated upon this question.

In 1917 Hey-Groves published an operation for the reconstruction of damaged crucial ligaments. It is with this operation, its indications, technic, and results that this presentation is concerned.

In 1926 I published a short paper reporting 3 cases, 2 of which were eminently successful, and 1 doubtful. Since then I have operated upon 5 additional cases with one complete failure, three good results, and one case still too early to evaluate, since he is still in hospital. Thus in a total of 8 cases, 5 were successful, the joints being restored to substantially complete usefulness; one doubtful, having been lost from observation ten weeks after operation; one too recent to evaluate; one failure. The latter was in a colored male aged thirty-six whose joint at operation presented considerable traumatic arthritis with degenerative changes in the soft parts and in the articular cartilage.

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Symptomatology and Indications.—The crucial ligaments are tough round bands ¼ inch thick, connecting the femur and the tibia. Their size and strength attest their importance for the stability of the joint. The anterior one pursues a course within the joint from above downward, from without inward and forward. It checks forward displacement of the tibia and hyperextension of the joint. The posterior crucial runs from above downward from before backward and outward. It checks posterior displacement when the joint is flexed.

There can be no doubt that both ligaments are torn in gross dislocations of the knee. In these cases the crucials do not repair, yet despite this fact, such cases may result in functionally useful joints, as observed by Sir Robert Jones and others. I have seen two or three such cases. They occur in young adults whose adaptability is great enough to permit the quadriceps extensor muscle to take on what may be called a vicarious or compensatory function and maintain by its sheer efficiency, the functional stability of the joint.

A case in point deserves mention here. An able bodied seaman thirty two years of age was sent to me because abnormal mobility of one knee joint was discovered in a general examination. He had some years previously a gross dislocation of the knee. On examination he presented marked preternatural mobility in the lateral and anteroposterior planes. However, when he contracted his quadriceps, he was able to counteract this abnormal mobility. Since he had been able for several years to perform the laborious work incident to his calling, I did not, of course, operate upon him.

The cases of gross dislocation or of very recent injury are therefore not to be considered as subjects for operative intervention. The cases which come up for consideration are those of chronic disability or of acute recurrent disability.

The outstanding symptoms of crucial ligament damage is instability.

The chronic cases are grossly and persistently disabled to the extent that the wearing of a brace or the use of crutches is necessary. They give a history of a severe injury of the knee

joint followed by marked disability uninfluenced by physiotherapeutic or other measures. On the other hand, the initial injury may have been comparatively moderate, but followed by chronic or recurrent effusions into the joint. On examination, the increased and characteristic anteroposterior mobility is found. This may be accompanied by increased lateral mobility, especially in those cases in which recurrent effusion has taken place. Operation in such cases will sometimes demonstrate that the ligaments, instead of being frankly ruptured, are attenuated, frayed out, and very much relaxed.

It must be obvious that for a case of the type above described only three possible forms of treatment are possible: (*a*) Permanent brace wearing; (*b*) arthrodesis; (*c*) operative reconstruction.

The second type of case is the acutely recurrent case in which the knee suddenly gives way in the course of a comparatively mild exertion. Here, apparently, the quadriceps, which has been sufficient for ordinary purposes, is caught off its guard, and the strain is thrown upon the secondary lines of defense, *i. e.*, the ligaments which, being absent or insecure, allow the joint to give way. In such cases the characteristic anteroposterior hypermobility is present, with little or none of the increased lateral mobility.

I have seen no cases of isolated injury of the posterior crucial ligament. In 2 cases of this series extreme attenuation and relaxation of both ligaments were demonstrated at operation, and in both cases repair of the anterior ligament resulted in a functionally satisfactory joint.

Operative Technic of Anterior Crucial Reconstruction.—The technic I use is based upon that of Hey-Groves and Alwyn Smith, the latter having modified it to include the construction of an internal lateral ligament. I have further modified it in the particular that I use what I have described as the "general utility" incision for exposure of the joint, rather than the horseshoe incision. This incision extends from the tibial tubercle upward alongside the inner border of the patella, then upward between the vastus internus and rectus to the top of the quadriceps

Fig 219.—Exposure of the knee joint by the use of the writer's "general utility" incision.

Fig 220.—Separate incision for fascia lata strip.

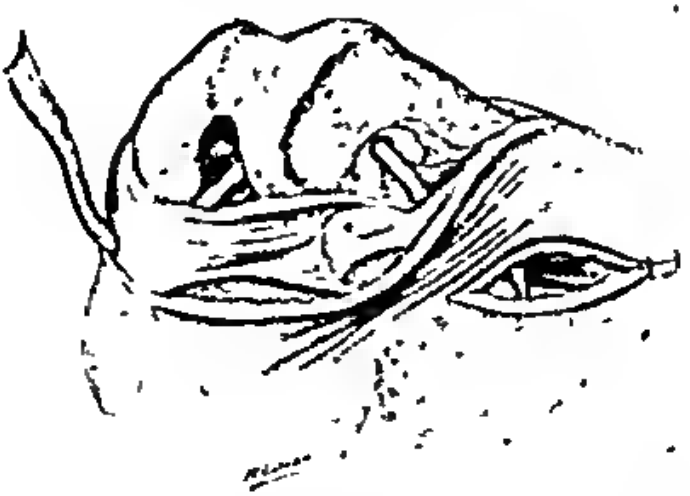


Fig 221.—The Hey Groves reconstruction of the anterior crucial ligament.

pouch. By displacing the patella over the external condyle, and flexing the knee, a very satisfactory exposure is obtained.

The operation is done under tourniquet placed as high in the thigh as possible. It occupies about one hour. After the joint has been exposed and the pathology determined, a separate long incision is made on the outer side of the thigh. A strip of fascia lata at least 10 inches long and 1½ inches wide is stripped from above downward, leaving its lower attachment intact. A cord is made of the strip by rolling its sides together. It is left *in situ* temporarily, the incision being closed over it with two or three

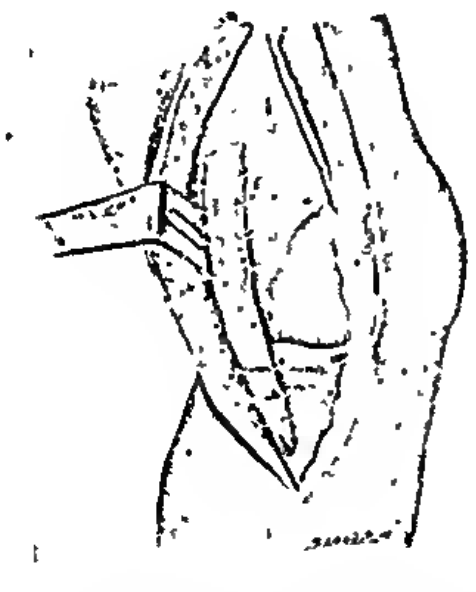


Fig 222.—Alwyn Smith's method of utilizing the end of the fascial strip for the construction of an internal lateral ligament.

towel clamps. The patella is then displaced and the joint is flexed to a right angle A ¼ inch drill hole is made through the external condyle in a direction somewhat from above downward, and terminating somewhat posteriorly in the intercondyloid notch. A second drill hole is made through the internal tuberosity of the tibia, from below upward, and from within outward, terminating within the joint approximately at or somewhat in front of the usual area of insertion of the anterior crucial ligament The lower portion of the long incision is then again exposed, an opening is made through the vastus externus into

the joint, the fascial strip is pulled through. The strip is then pulled successively through the femoral and tibial drill holes, terminating on the antero-internal face of the tibia. Here it is unrolled, pulled quite tight with the joint flexed about 20 degrees, and sutured firmly to the periosteum. The remainder of the strip is reflected upward on to the internal condyle of the femur. The bone is bared, and the synovia is sutured over the strip. The incisions are then closed and a compression dressing is applied. The joint is immobilized three weeks in the attitude of 20 degrees flexion. Physiotherapeutical measures directed to the development of the quadriceps are then begun. Walking, at first with support, is begun, but no brace is used. No passive motion is used, but the patient regains his motion by voluntary effort and use.

Case Report. The following case is reported in detail because it emphasizes that the possibility of crucial ligament injury must be borne in mind in any recurrent injury to the knee. In this case the diagnosis was made at exploratory operation, the preoperative examination having failed to include tests for the characteristic hypermobility of crucial ligament injury.

S. F., male, age eighteen years, first seen in the out-patient department of the Hospital for Ruptured and Crippled on November 27, 1926. He had twisted his left knee playing football two days previously. His joint was distended with fluid, and he complained of pain on the outer side. A compression dressing was applied and he was sent home. One month later, while stepping into a trolley car, the knee gave way and he had to be carried into the car. I saw him on February 12, 1927, and advised his admission to the hospital for exploration of the joint on account of recurring disability and effusion. The joint had been twice aspirated during his attendance at the clinic, each time a quantity of serosanguineous fluid was removed.

On admission as an in-patient four days later, he was examined by Dr. Samuel Kleinberg. There was marked effusion, very little restriction of movement, and tenderness along the head of the tibia on both sides of the patella tendon. Dr. Kleinberg injected the joint with oxygen and had an x-ray of the injected joint made. This disclosed a thick transverse band dividing the quadriceps pouch into two portions.

I operated upon him three days later. The joint was opened by the general utility incision, and disclosed:

1. An incomplete shelf across the lower portion of the quadriceps pouch which ended in a falciform edge.
2. Moderate thickening of the fat pad.

3. Intact semilunar cartilages.

4. The anterior crucial ligament was ruptured, and its stump lay free on the tibial surface The posterior crucial was intact.

The anteroposterior mobility was then tested, and it was found that the tibia could be displaced forward on the femur for a considerable distance

The operation consisted of the typical reconstruction of the anterior crucial ligament, as described above. The transverse band across the pouch was also excised.

Upon completion of the operation the anteroposterior mobility of the joint was tested, and it was found that the abnormal mobility which was present before the plastic procedure was performed, was now entirely controlled.

He was discharged from the hospital on the twenty-sixth day, walking with the aid of a stick. Except for one visit to the clinic five days later, at which time he was walking without a stick, and with a range of motion of 60 degrees, he was not again seen until October, 1929, more than two and one half years after operation.

On the latter date he was induced to return to the clinic and I presented his case at a clinic for the Association of New York Central Railroad Surgeons He stated that there had been no further trouble with the joint, and that he had at various times played football. The range of motion was complete, and there was good stability.

CLINIC OF DR. LILIAN K. P. FARRAR

Woman's Hospital

A REPORT OF THE MAYO OPERATION (VAGINAL HYSTERECTOMY) PERFORMED ON TWO PATIENTS EACH OVER SEVENTY YEARS OF AGE AND DONE UNDER SPINAL ANESTHESIA

It is seldom that a woman over seventy years of age needs to have a hysterectomy performed because of a myoma or prolapse of the uterus when neither the tumor nor the uterus has undergone a malignant change.

Case I.—The first patient to be reported was seventy-seven and one half years old when she entered the Woman's Hospital in the fall of 1925 because of constant pain for three months in the right lower quadrant of the abdomen, due to a tumor approximately the size of an orange. The tumor was symmetrical in outline, soft in consistency and attached to the fundus of the uterus, but distinctly separate from it This growth had been noted two years previously when it was about the size of a large plum

The patient has had three children and two miscarriages, no operations. She had suffered from backache for ten years due to a prolapse of the uterus and for two years the cervix had protruded through the vulvar orifice when she did not wear a vaginal pessary The diagnosis of ovarian cyst was made because of the location and consistency of the tumor, and because of the fairly rapid growth it was thought to be malignant. The patient was of sturdy American stock and strong for her years

The physical examination showed a mitral systolic murmur but the heart was compensating. The lungs were normal except for a few dry but not constant râles. The blood count was 4,096,000 red cells and 85 per cent hemoglobin. Blood pressure 130/80, blood Type II. The urine was negative for sugar and albumin and the phenolsulphonephthalein test was 65 per cent; the CO_2 40.

The patient was so uncomfortable from constant pain that she desired the operation, the seriousness of which both she and her family understood.

The operation was begun under spinal anesthesia but the abdomen had been prepared in case it proved to be impossible to remove the tumor from below, owing either to its size or to firm adhesions and a laparotomy would be imperative. The spinal anesthesia was given (0 12 mlgr novocaine)

by Dr Labat's method and a vaginal hysterectomy was done according to Dr Charles Mayo's technic, removing the uterine tumor and both adnexæ. The broad ligaments were clamped off on each side beginning from above after freeing the bladder and opening the peritoneal cavity, anterior and posterior to the cervix as shown in the illustrations. The broad ligaments

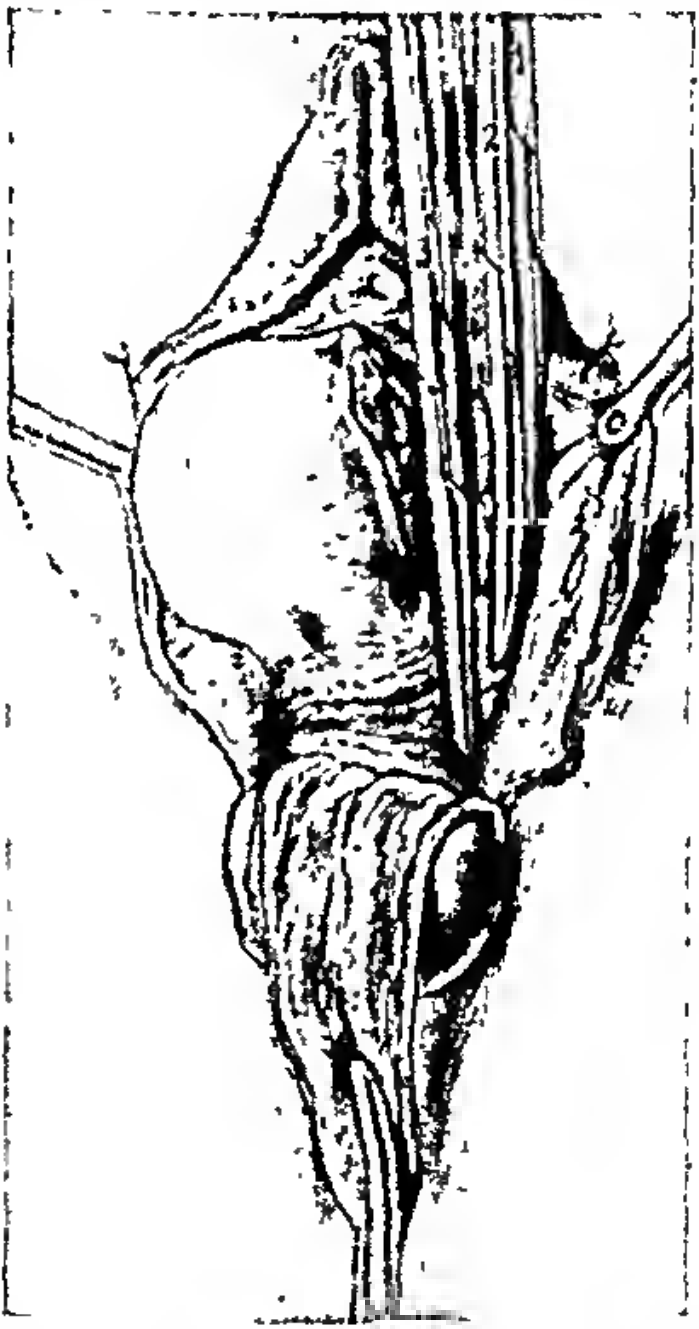


Fig 223.—Kocher clamp applied to left broad ligament close to the uterus which is then cut away. Similar clamp on right.

The illustrations, Figs 223 to 229 inclusive, in this clinic appeared in Kelly's "Gynecology" in articles by Dr. George Gray Ward. They are used here with the kind permission of Dr. Ward and D. Appleton & Co., the publishers.

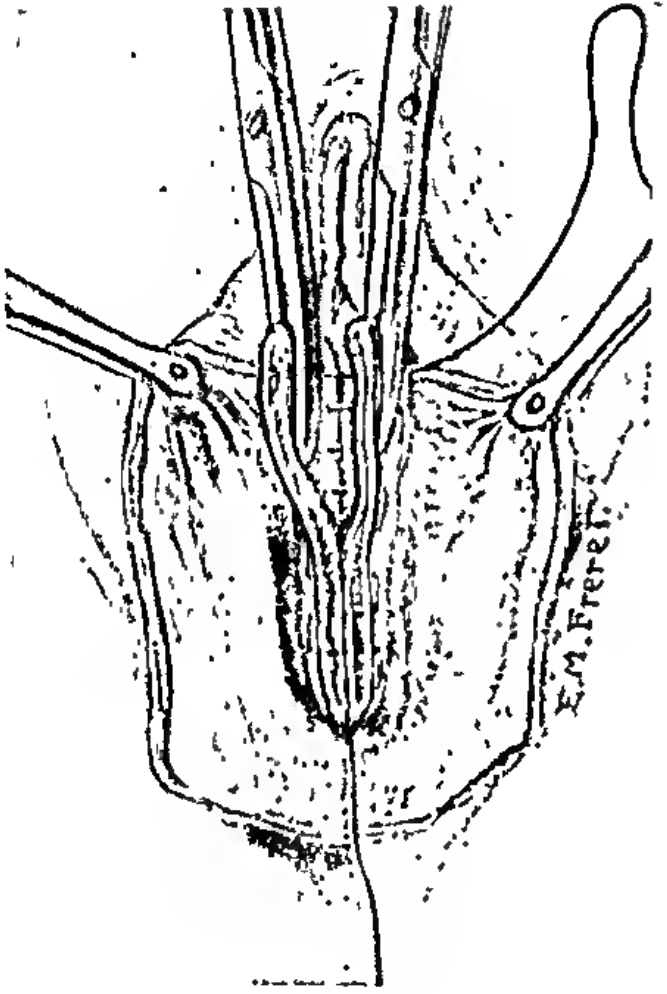


Fig. 224.—A continuous mattress suture through the broad ligaments, *back* of the clamps, which are removed as each suture is passed.

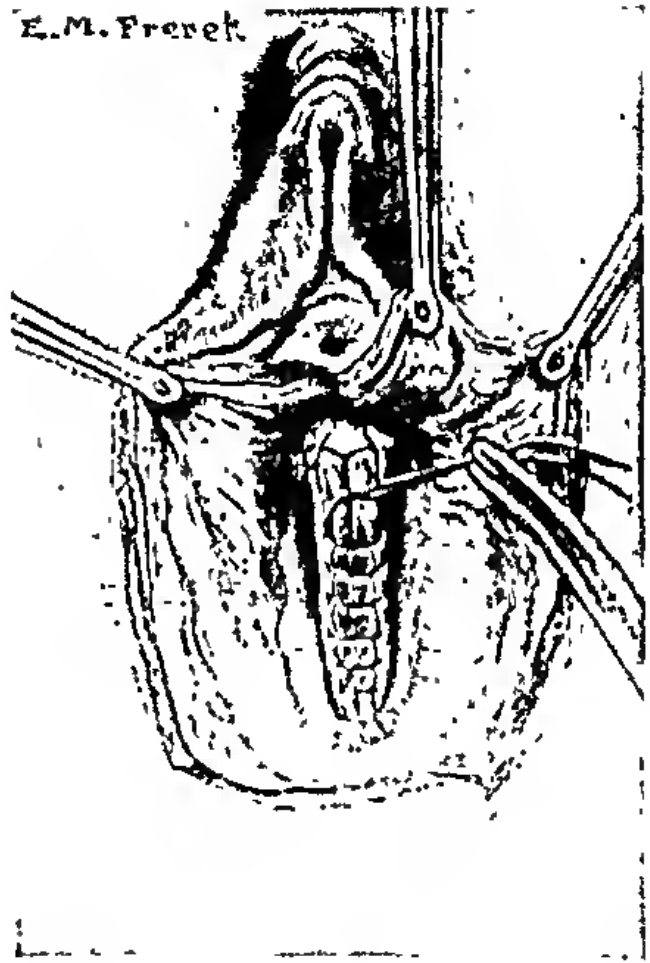


Fig. 225.—Broad ligaments firmly united, and bladder peritoneum sutured to upper surface of this "bridge."

were then sewed together, after ligating the uterine vessels and all bleeding points The "bridge" of tissue thus formed was to be the floor of the abdominal cavity The bladder was sewed by its peritoneum to the upper surface of the "bridge" The anterior edge of this tissue was then anchored firmly by two linen sutures One suture was passed through the periosteum of the right pelvic bone and the other similarly through the left. A third suture fastened the tissue below the urethra to prevent a recurrence

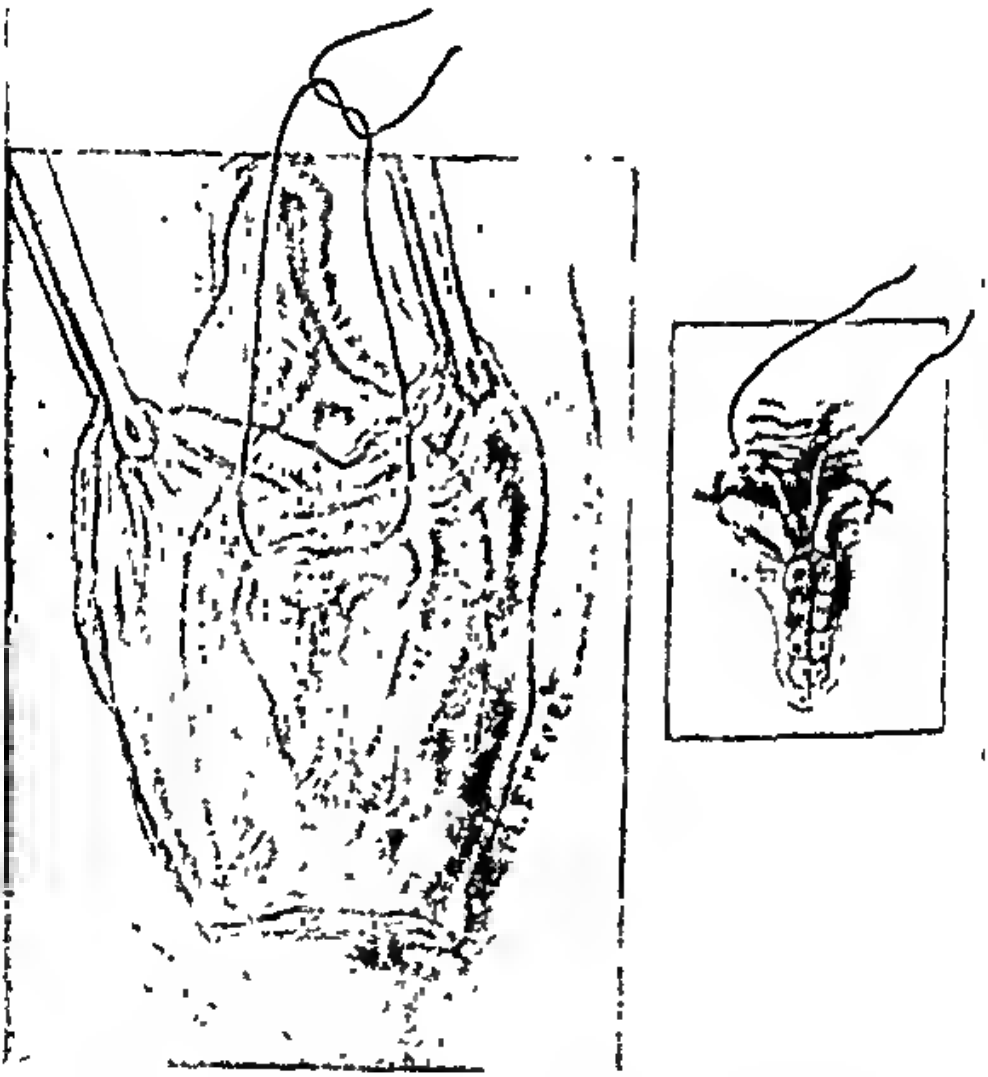


Fig 226.—Right side being sutured to the periosteum Insert shows both sutures in periosteum and third suture being placed

of cystocele The uterosacral ligaments were then fastened by linen suture to the posterior end of the "bridge," thus making impossible the occurrence of an enterocele The fascia and mucosa of the vagina were sutured below the "bridge" The pelvic floor was repaired by suturing the torn urogenital diaphragm, reuniting the levator muscles and closing Colles' fascia and the mucous membrane of the vagina (Figs 224-229)

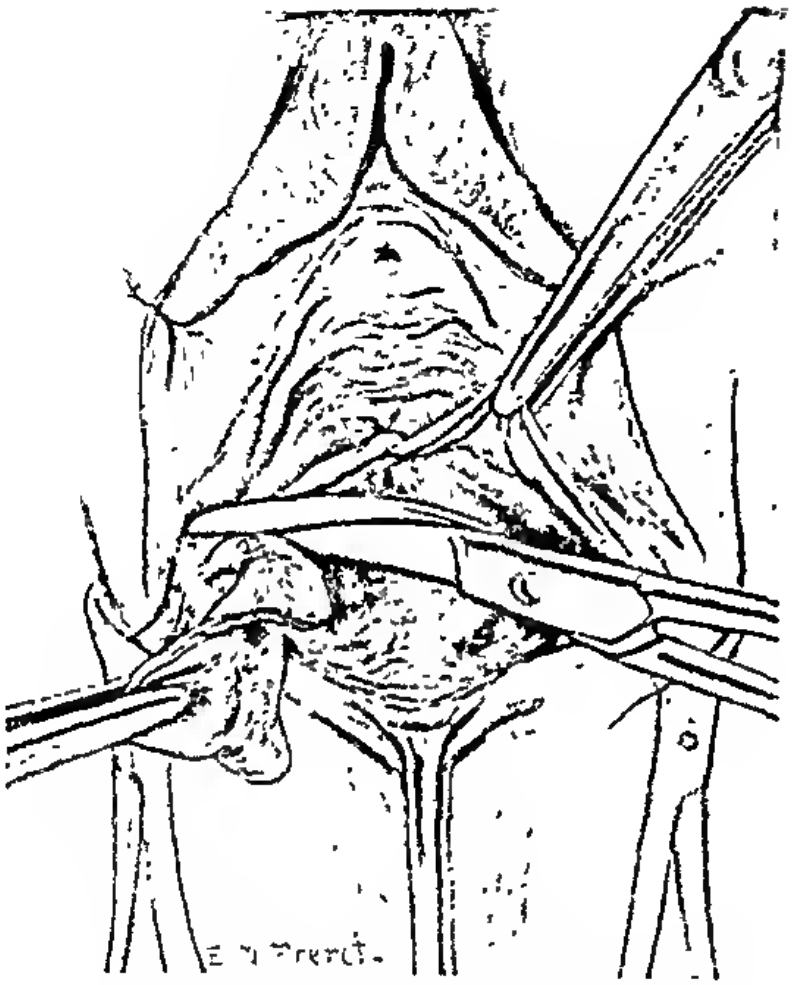


Fig. 227.—Rectopexy. Rectopexy stitch tied and vaginal wall cut away along incision outlined at beginning of operation.

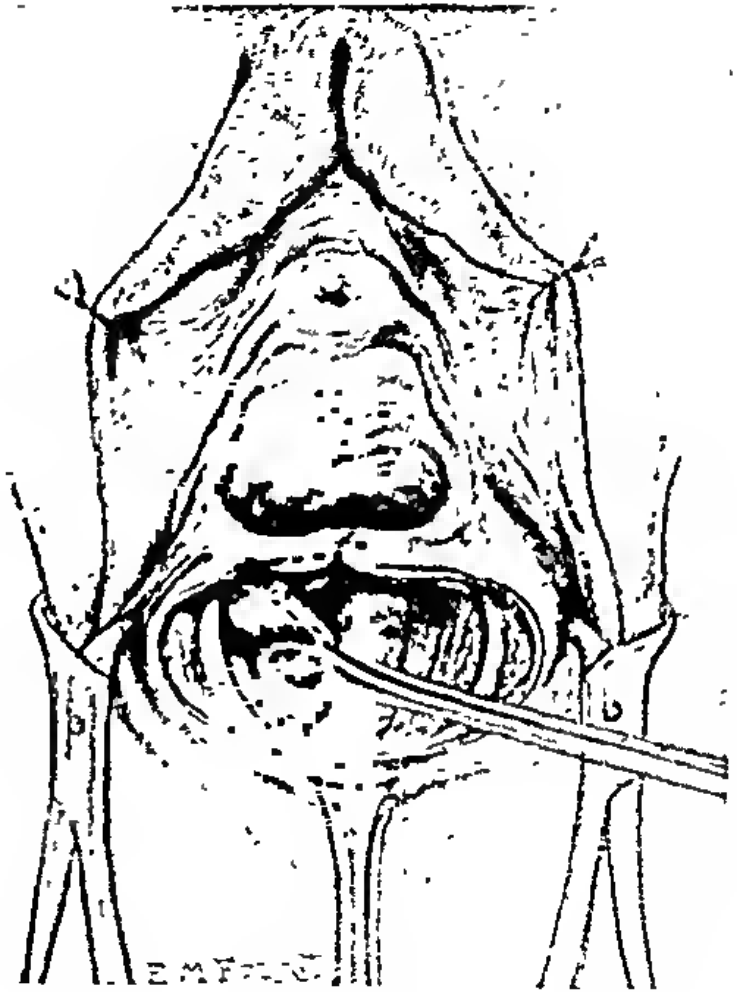
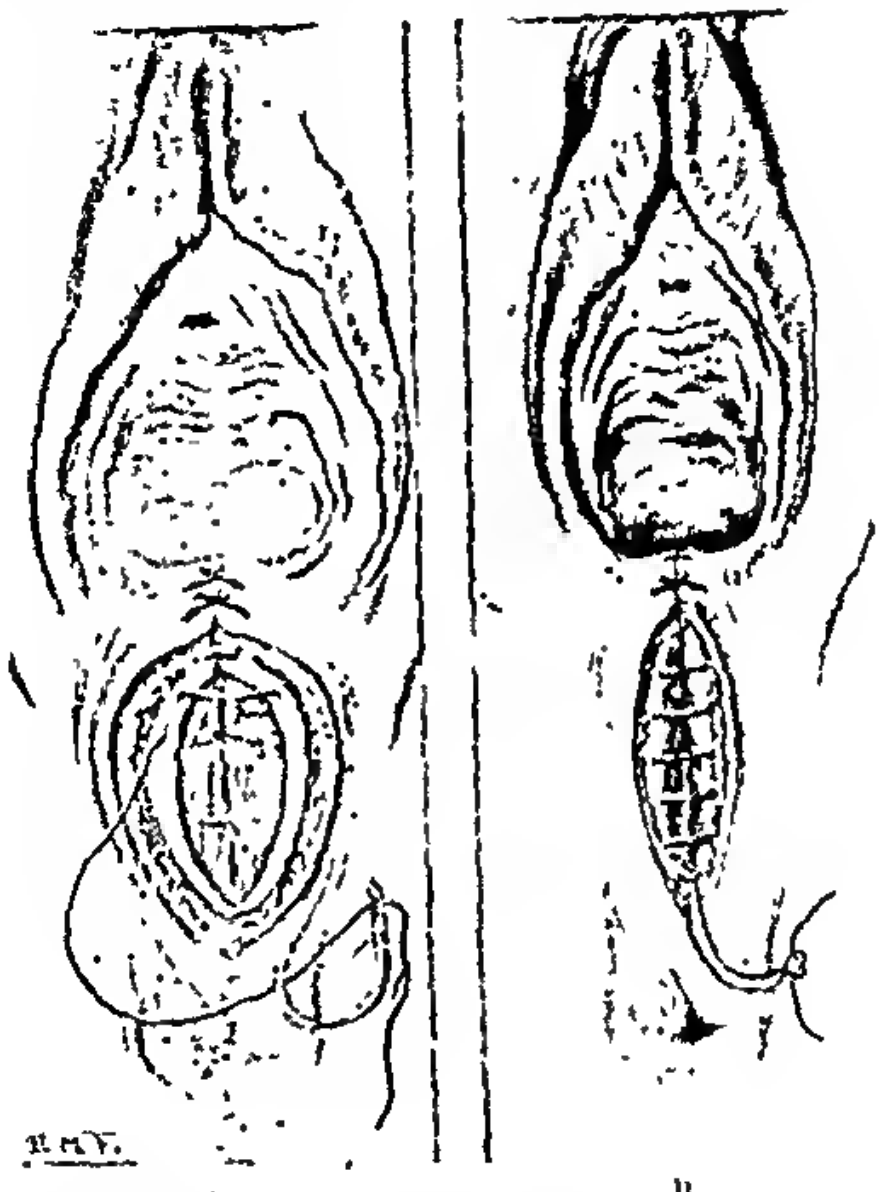


Fig. 228.—Anterior margins of levators grasped with sponge forceps and drawn toward midline

The total duration of the operation was one hour and thirty-five minutes. The patient said that the only time that she felt pain was when the tumor was removed. This was adherent and had to be freed from the pelvic wall. It was soft and brought out without morcellement, although larger than esti-



A B

Fig. 229.—A, Levators sutured together with interrupted catgut sutures. Sharp edge of Colles' fascia seen on each side of wound next sutured with continuous suture, which at its origin is passed wide and deep to include fused fascial structures at this point. Suture also catches united levators. B, Skin margin then closed with a subcuticular tanned catgut suture and end tied to fascial stitch. The knot disappears between margins of the incision.

mated previously. The pathologist reported "several edematous polyps in the uterus and free fluid in the uterine cavity and several myomata in the body of the uterus. Hyalinized myoma the size of a grapefruit attached to the

uterus. No evidence of carcinoma." The anesthetist said that the patient was in excellent condition at the end of the operation and "no sign of shock" The pulse was 140 at the beginning of the operation and 78 at the end The respirations were 26 at the beginning and 26 at the end. Her blood pressure taken just before the operation was 150/90 and taken again immediately at the end of the operation was 135/78 During the entire operation a solution of 6 per cent gum acacia and 20 per cent glucose (425 cc) had been given intravenously. This solution we consider of great value as a prophylactic measure against shock, and of especial value when spinal anesthesia is used for the aged. The patient made a splendid recovery and left the hospital in three weeks with an absolutely perfect result. She has been most conscientious not to lift heavy things nor strain, realizing that at her age, after such an operation, this is imperative Pelvic examination has been made several times since the operation and the last one was made a few months ago The same satisfactory condition still exists. The patient is now approaching her eighty-second birthday and is able to take motor trips or walk as her general strength allows She is an enthusiastic botanist and roams the woods in summer with her young grandson to impart her knowledge to him

Case II.—The second patient entered the Woman's Hospital in the summer of 1928. Her chief complaints were bearing down pain in the lower abdomen and purulent vaginal discharge of seven months' duration with partial loss of vesical control for this time She had had six pregnancies and two miscarriages. Her height was 4 feet 10 inches, her weight 101 pounds Blood pressure 158/86. The heart was increased to the left and there was a blowing systolic murmur. Examination showed a large cystocele, prolapse of the uterus, ulceration of the labia, pyometra, and red blood cells in the urine I saw the case in consultation, as I was off duty in the summer, and advised a diagnostic curettage and radium if the condition proved to be cancer of the fundus The pathologist reported "nonmalignancy" and the patient left the hospital in a week

She returned seven months later with a complete procidentia, uterine bleeding and complete loss of vesical control. I was then on duty so it fell to my lot to care for her I kept her for a week to study her a bit. She was quite small and with her bobbed hair, bright eyes, and perky birdlike ways gave one an impression of more vitality than the usual seventy-two-year-old patient. She was very deaf and always spoke in a husky whisper so that when she told me that she was so miserable that she "would rather die than live that way" it seemed so impressive that it gave me the necessary impulse. I thought it might be possible to do a two-stage operation and asked the attending doctor to see her in consultation. He thought despite her heart that she was "no greater operative risk than *a woman of her years*" That somehow didn't give me as much encouragement as perhaps it ought to have done and wondering just how foolish I was I went ahead to summarize her general condition which was as follows:

The blood count was 4,550,000.

Hemoglobin—86 per cent.

Urine—no albumin, no sugar.

Blood sugar—63 mg per 100 cc.
Urea—8 31 mg per 100 cc.
CO_2—53
Clotting time four to thirty minutes
Blood Type II
Blood pressure 160/85.

A compatible donor was found and ordered to stand by in the hospital at the time of operation

A Mayo vaginal hysterectomy was done with Lafat spinal anesthesia of only 0 05 milgr novocaine as the patient weighed only 101 pounds and I did not hope to do more than a one-stage operation that afternoon, 250 cc. of gum glucose was given during the operation intravenously. The bladder was densely adherent at its base and to avoid injury to that organ I cut so far from it that I cut into the much thinned out cervical canal (I had previously sutured the lips of the cervix as there was a pyometra) and there was immediately a gush of purulent fluid from the uterine cavity That did not add to my comfort at the moment but was no cause of trouble later for the wound healed perfectly As the patient was not conscious of pain after the completion of the hysterectomy, I hurried on to repair the pelvic floor. The total time of the entire operation was one hour and fifteen minutes. The pulse was 96 at the beginning of the operation, 76 at the end. Respirations 20 at the beginning of the operation and 24 at the end The blood pressure taken just before the operation was 126/70 and at the end of the operation 138/88 A blood transfusion was given as soon as the patient was in the recovery room because she was so slight I feared even the small amount of blood lost might be too much for her.

The pathologist reported "prolapsed uterus with cervical tissue with erosion and inflammation" The next morning early, before beginning rounds, I went into the recovery room and found the patient sitting bolt up right in bed and thoroughly indignant. She said in her queer husky stage whisper, 'Why don't they take me down stairs? I shall be the last—I should have been the first" She was never an unwilling patient, but more like a restless child continually bobbing up in bed. She made an excellent recovery and had a perfectly satisfactory result except that her repeated sitting up broke the final suture in the vaginal mucosa. This does not effect the support of the pelvic floor in the least, but takes off from the cosmetic effect. Nine months after the operation she appeared in the follow-up clinic and demanded in her deep throaty voice—"Why do I have to come? There isn't a thing the matter with me It's years since I have felt so well" One of the internes after examining the patient said to me, "Why don't you put just *one* stitch there, Dr Farrar, then she would be absolutely perfect?" I replied, "No sir! If trouble comes staring me in the face I'll have to take it, but I don't go looking for more—not when they are seventy-two"

Fortunately at seventy a nonmalignant condition does not often arise that calls for a hysterectomy and radium will care for cancer of the uterus without operation. In the patients for

whom operation is imperative a spinal anesthesia is, I believe, the safest anesthesia and I like to safeguard that with gum glucose solution to prevent too great a drop in blood pressure and then give a blood transfusion to replace the blood loss, be it only a small amount.

It is equally important to have assistants who are thoroughly familiar with the technic and ready to help, and no little credit is due to them for the successful result in these two operations.

CLINIC OF DRS. WILLIAM L. SNEED AND H. EUGENE READING

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FRACTURES OF THE SPINE

FRACTURES of the spine are here being considered under three main anatomical divisions: *cervical*, *dorsal*, and *lumbar*. Under each of these headings the injuries will be treated as, first, simple compression fractures of the vertebral bodies; second, fractures of the bodies, including laminae or spinous processes; third, fractures of the vertebral body with or without slight dislocations, having *mild nerve or cord lesions;* fourth, fractures of the vertebral body, lamina or spinous processes, with or without dislocations, and having *serious nerve or cord lesions*.

Mechanism of Fractures of the Spine.—Compression fractures of tbe vertebral body, regardless of the region of the spine, are produced by force being applied indirectly to the vertebral bodies. This force may result from a fall causing the patient to land on the feet, head or buttocks; or secondarily, by a forcible bending forward (flexion); or by a combination of the two. Woolsey, in Keen's Surgery, states that "compression fractures occur only in those vertebrae which have a supporting function." Fracture of the lamina or pedicle may be due to a forward dislocation of the body, or to direct violence applied over the back. Several authors (Treves and others) report fractures of vertebral bodies occurring as a result of muscle action alone, although this is rare. Fractures of the ribs or spinous processes are not infrequently due to sudden muscular violence.

Diagnosis.—The diagnosis is based upon the history of injury and the usual symptoms accompanying a fracture of the spine. Practically every case will have localized tenderness over the

injured segment together with spasm of the surrounding back muscles over an appreciable area. Pain is of varying degree, oftentimes it is very slight, amounting to nothing more than discomfort. Deformity may or may not be present on physical examination even though the injury is severe. It is rather common to find a kyphos, especially in injuries of the dorsal spine. As a rule the reflexes are either exaggerated or absent, depending upon the degree of trauma and cord irritation. Abdominal distress is commonly complained of, all cases having at least slight distension and constipation. These abdominal signs may not make their appearance for two or three days after, or until the patient is placed in hyperextension. Bladder symptoms vary in their intensity and are seen less often than distention of the abdomen. When priapism is present it denotes severe cord pressure, suggesting a serious outcome. Complete loss of sexual power denotes absolute severance of the spinal cord, severe hemorrhage or inflammatory reaction, occasionally it is due to mental depression following injury

To those who have been accustomed to seeing a large number of fractured spines, often undiagnosed for from several days to several months, the walk of the patient is as characteristic as the waddling gait of the dislocated hip. It is careful—the feet are put down gently with each step, the spine is held in a protected position by muscle spasm. There may be a lateral or forward bend of the trunk, but very few of these patients hold themselves entirely erect It is oftentimes of importance, where questions arise in regard to diagnosis, to watch patients of this character in unguarded moments in their manner of walking. One can be very certain that there is little wrong with the vertebral spine if a patient walks briskly, clicking the heels at every step.

The character of the patient, station in life, physical and mental make-up, together with pending law suits or responsibilities, must all be considered, both from a diagnostic and treatment standpoint It is very difficult in those that have been coached, or in certain shrewd individuals to distinguish between voluntary and actual spasm; neither is it an easy matter to determine whether the patient actually suffers the amount of

pain complained of. It is only after a careful, painstaking examination and sometimes hospitalization and observation that an accurate estimation of the probable amount of disability can be gauged. This is especially true in the so-called "low back pain."

It has been mentioned by some observers, and is of value, to test the pulse rate when the patient is fully relaxed, and then carry out movements that the patient claims are very painful, carefully noting whether there is an increase in the pulse rate As a rule, any severe pain will accelerate the heart rate

The character of the walk, as before mentioned is quite important. There are many other factors that might be considered; and after all data is at hand, and examinations and observations have been made, even then it is sometimes quite difficult to make an accurate summing up.

Special consideration is due in examinations of injuries in the region of the fifth lumbar vertebra. This becomes necessary because of the anomalous conditions that are so frequent at the lumbosacral junction. There are many variations of this juncture in normal individuals, hence the difficulty of obtaining proper shadows in *x*-ray pictures. This is especially true in heavy, obese individuals.

Special technic and a careful examination and interpretation of *x*-rays are more necessary here than in any other part of the spinal column. The tuft of hair over the skin area of the lower lumbar spine and sacrum usually indicates a congenital failure in closure of the neural arch.

Anomalous transverse processes and their interpolation with the ilium must also be considered They frequently present a malalignment, with deviation more to one side, and a lessened depth on one side This latter condition is often a predisposing cause for rotary lateral curvature of the spine.

Articulations of the transverse process, external to its origin from the vertebral body—especially the first lumbar—not infrequently may present a clear cut outline, but as a rule cartilaginous joint surfaces may be seen Careful examination together with stereoscopic *x*-rays should be sufficient to diagnose the condition

accurately without making an erroneous diagnosis of a fractured transverse process

Treatment.—In discussing the treatment, the reader is asked to bear in mind the anatomical divisions mentioned in the first paragraph of this paper

A simple compression fracture of a cervical segment requires immediate immobilization of the upper spine by means of a Calot plaster-of-paris collar. This plaster is so applied that the head and neck will be held in a normal anatomical position, the chin slightly elevated so as to produce moderate hyperextension of the cervical spine. In the average case of this sort the patient may be allowed to return home as soon as the plaster dries. This form of treatment would also apply where there is a simple fracture of a lamina or a spinous process. After several weeks the plaster is replaced by a molded leather collar which the patient wears for a period of three to nine months, depending upon the severity of the case

If the compressed cervical vertebral body is dislocated and there are little or no nerve symptoms, gradual traction may be applied by means of a chin strap, until adequate reduction can be accomplished. If necessary, reduction might be attempted under gas anesthesia, the pull being in a straight line from before backward, as illustrated in Fig. 230. Caution must be used not to exert too great a force if untoward results are to be avoided.

The compression fracture of a cervical body that presents, in addition to a dislocation, a greater or less degree of nerve involvement, may not in many cases be successfully reduced. The patient's family should be informed of the probable dangers that are sometimes encountered in reducing the dislocated cervical vertebra. Complete reduction in this type of case is often inadvisable, since violent manipulation may result in a complete paralysis, sometimes causing a fatality. Careful study of the case by x-ray should enable one to judge fairly accurately as to whether there has been fragmentation of the cervical body posteriorly, or the possibility of bony spicules impinging on the spinal cord. In the selected cases, if reduction under anesthesia is decided on in preference to slow, gradual traction, the patient

should be well relaxed. While an assistant exerts traction on the head in a straight line, the operator applies direct digital pressure to the dislocated vertebra, through the pharynx, guarding against injury to his fingers by the possible sudden spasmodic contraction of the patient's jaws. A padded sponge stick may be substituted for the fingers.

In treating those cases which show marked nerve symptoms, one must not lose sight of the fact that at the time of injury a vertebral body may have taken a sudden forward excursion

Fig. 230.—Showing method of applying straight traction in reducing a fracture of a cervical vertebra As a rule the Hawley table is used in this procedure.

causing only an instantaneous pressure on the cord, and then snapped back in what appears by *x*-ray examination to be its normal anatomical position.

It is often of great significance to determine whether the paralysis occurred immediately after the injury or hours later. The latter would lead us to suspect gradual, progressive hemorrhage into or about the cord, or a posttraumatic inflammatory process.

In those patients showing a predominance of cord symptoms, the aid of a competent neurological surgeon should be sought;

and when surgical measures are decided upon, it is to be preferred that the operation be performed by the neurological surgeon. Few of the general or orthopedic surgeons are sufficiently well qualified for this particular type of operation.

In the experience of the writer, very few cases showing complete paralysis have been benefited by any type of treatment.

Fusion operations for the cervical spine are rarely indicated, because the cervical vertebrae heal more kindly than those in the remainder of the spinal column, due to several factors First, there is less superimposed weight from above; second, it is easier to immobilize that part of the spine and to relieve the injured vertebral segment from the superimposed weight; third, speculatively, it may be due to the anatomical fact that there is less spongy bone in the cervical vertebrae as compared with the larger vertebral bodies lower down; and fourth, probably because of a more abundant blood supply in the cervical region.

In the *dorsal spine* the simple compression fractures or those involving only the spinous processes or laminae have been successfully treated on a Bradford or other frame, carrying out hyperextension Depending upon the tolerance of the patient, the frame is bent slightly at the level of the injured segment in order to accomplish gradual hyperextension of the spine so as to remove all pressure from the wedged vertebral body, and not interfere with nature's effort at repair.

Hyperextenston is also necessary to prevent the superimposed weight of the trunk (above the level of injury) from further crushing the already compressed vertebral body to a greater degree during the healing period. One cannot expect to reduce a compression fracture by hyperextension of the spine; for as a rule, the fractured vertebra heals in the deformed condition, as it is presented when first seen. In an occasional case there is a slight filling in of the wedged portion of a crushed vertebral body When the compression fracture is very slight it may almost resemble a normal vertebra with only a semblance of wedging.

Woolsey, in Keen's Surgery, states:

"The kyphosis due to compression fractures cannot be entirely

and permanently relieved for it depends upon the flattening of the bodies, and reappears, in part at least, as soon as the patient again assumes the erect position. Unless the kyphos is reduced as much as possible at first, it becomes fixed by the contraction of the muscles and ligaments and often by the synostosis of the affected vertebra, so that late correction is ineffectual."

Compression fractures with varying degrees of *dislocation*, and presenting only *mild neurological symptoms* may be treated in a conservative way, similar to that of simple compression fractures, as described in the previous paragraphs. The majority of these are borderline cases between conservative and operative treatment. It is our custom first to institute conservative measures until certain definite symptoms, which will be discussed presently, justify us in taking a positive stand in regard to operation. Repeated *x*-rays are taken at frequent intervals, while the patient is still hospitalized, to determine whether or not non-operative treatment of itself has been sufficient.

Cases with *marked dislocation* of a crushed vertebral body, together *with cord compression*, though showing very little neurological symptoms, should be operated upon as soon as the patient has recovered from the primary shock. Compression fractures, with severe cord symptoms, coming on immediately after the injury, or even occurring many hours later, due to hemorrhage or inflammatory reaction, are cases for neurological consultation. The results in these cases are often unsatisfactory; and it is this type of injury which comes within the realm of neurology and that of orthopedics, being best handled by cooperation between the two specialties

It has been impossible, with the limited knowledge at our command, or with the assistance of our confreres, to get as good results with these cases as have been reported by a number of workers in this and other sections of the country.

Every effort should be made, from the standpoint of the welfare of the patient and family, and for the protection of the surgeon who first sees the case, to have the best professional ability available in consultation, the course of treatment outlined, and the probable results of the case explained, so that

from the time that the patient is first seen, even to the point of hypnotic suggestion; especially in those who have been told that their case is "hopeless"; their "back is broken," and they will never be able to take their place in society again, or be able to earn a living. It is sometimes beneficial to explain to them their own *x*-rays, and to present to such patients one or more cured cases originally worse than their own, in order to relieve their minds as much as possible. It is a well recognized fact that many cases will become neurotic, especially in the male where sexual power may be decreased or entirely lost.

Operative Treatment.—The following indications would warrant operative procedure in cases of compression fracture of the spine:

1. Absorption of the body of the vertebra during the period of treatment by hyperextension, after sufficient time has elapsed to allow consolidation of the injured portion of the spongy bone.

2. Persistent pain at the site of tbe fracture after adequate conservative treatment in hyperextension. This does not apply to local point tenderness which is commonly present for a period varying from four to eighteen months

3. Fractures with dislocation may all be considered as operative cases for fusion—although an occasional case may get entirely well by conservative treatment. We consider all fracture dislocations of the fifth lumbar vertebra as operative cases.

4. Artbritic changes at the site of the compression fracture attended by persistent pain, in the absence of generalized acute arthritic symptoms in any other part of the spine.

In emphasizing the conservative form of treatment wherever possible, we quote Dr. Eikenbarry of Seattle who, in discussing the paper by Dunlop and Parker, on Spine Fracture, in the Journal of the American Medical Association, January 11, 1930, said:

"Last year before this section (Section on Orthopedic Surgery) I gave a report on about 120 patients that I had seen, some of whom I treated, some of whom I had examined, and in many of whom graft operations and fusion operations had been done. In not a single case in which a fusion operation was done, was the man able to go back to hard work. The only patients who

July 11, 1929 His general physical condition is good. He holds his neck rather stiff and there is a deviation of the neck to the left in its upper half. In addition there is a left upper dorsal scoliosis

Interpretation of *x*-rays by Dr Raymond Lewis is as follows:

"The lateral view of the cervical spine shows a fracture dislocation involving the seventh cervical vertebra and its articulation with the sixth. The upper surface of the seventh body is flattened anteriorly, the joint space is greatly diminished and the sixth cervical vertebra is displaced forward

Fig. 231.—Case I. One month after injury. Anatomical reposition of the dislocated seventh cervical vertebra was not attempted. Subsequent x-rays showed no change from that of Fig. 231. This patient is now symptom free.

almost one half the antero- [illegible] of the [illegible] body, and is tilted sharply forward so as to [illegible] there is no indication of any new bone formation.

On July 12, 1929, [illegible] applied to the head by means of [illegible], made of [illegible] cloth [illegible] formity. Following this [illegible] flar was

removal in order to be used for a mold over which a leather collar was made. The patient was seen on July 26, 1929 wearing his leather collar. At this time he held his head and neck straight, movements being only partially restricted and painless. He was again examined on September 5, 1929 and found to be in excellent general health. The spasm in the neck had entirely disappeared and there was now about 75 per cent of the normal range of motion in the neck. He was told to remove the collar and return to his occupation as engineer, in the early part of October, 1929.

This is a case in which conservative treatment was tried although the patient had a rather marked deformity accompanied by an abundance of neurological symptoms.

Case II.—On October 23, 1928, patient H. C., thirty-two years old, was driving his automobile which skidded. He was thrown out of the car landing

Fig. 232.—Case II, showing the bony bridge extending up from the twelfth dorsal vertebra anteriorly five weeks after injury.

flat on his back, immediate treatment being given at a local hospital where he was told he had a fracture of the twelfth dorsal vertebra, treatment consisting of lying in a recumbent position in an ordinary hospital bed.

When the patient was first seen by us on December 1, 1928 he was walking about without any back support. He complained of stiffness of his spine and pain in the region of the injury. There was also a marked weakness of both lower extremities.

x-Ray interpretation by Dr Raymond Lewis is as follows:

"Anteroposterior and lateral views of the lower dorsal spine show a badly deformed and compressed twelfth dorsal vertebral body, having all the appearance of a compression fracture. A bony bridge extends up anteriorly to the body of the eleventh dorsal, but whether there is an actual fusion cannot be positively determined. There is only a very slight kyphos deformity."

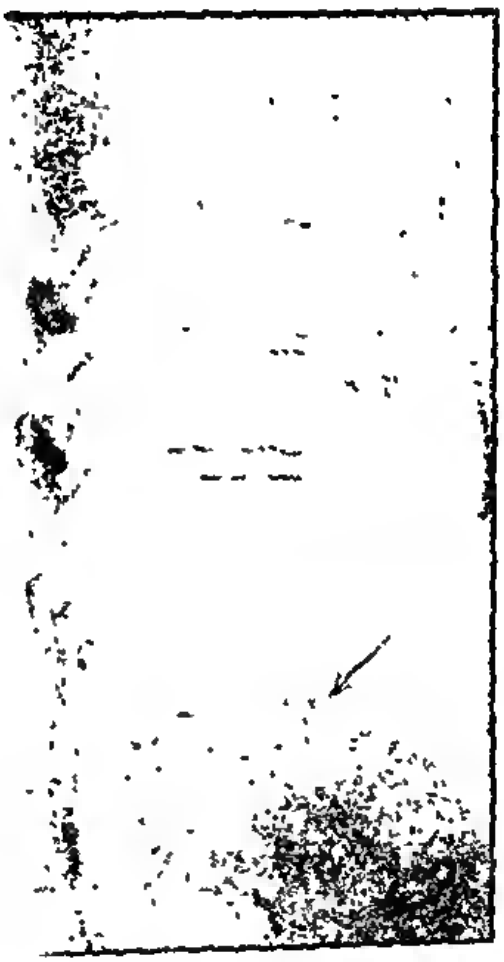

Fig. 234.—Case II. Showing a marked absorption of the body of the twelfth dorsal vertebra.

Later x-rays revealed a rather marked absorption of the body of the twelfth dorsal vertebra It was decided to continue with conservative treatment. He was placed on a Bradford frame, physiotherapy was instituted, and after four weeks he was discharged from the hospital wearing a plaster-of-paris corset, with the back in hyperextension

The neurological signs in the lower extremities had entirely cleared up. Repeated x-ray examinations disclosed that the injured twelfth dorsal seg-

Fig 235 —Case II Illustrates the practically normal painless function of the spine one year after the patient was injured

Fig 236 —Case II. Illustrates the practically normal painless function of the spine one year after the patient was injured.

ment was healing rapidly, there was only slight restriction of motion of the spine, and he had no further back pain At his own request he was permitted to return to work on May 15, 1929, seven months after sustaining his injury.

The average case of a crushed vertebral body showing progressive ab-

Fig 237.—Case II. Illustrates the practically normal painless function of the spine one year after the patient was injured

sorption usually requires operative treatment Here as in other cases of our series conservative treatment was given a long trial with excellent results.

Although there was more absorption of the injured vertebral body than usually found, in this instance the clinical result is good

Case III.—C A , age forty-seven years, was injured on January 18, 1927 when the scaffold on which he was working collapsed and he fell, landing on his back. *x*-Rays revealed a marked kyphosis in the upper lumbar region showing a compression fracture of the second lumbar vertebra, the body being diminished to two thirds of its normal depth The intervertebral cartilage between the first and second lumbar vertebrae was shown to be entirely destroyed

The patient was first seen by us on October 24, 1927 (nine months after his injury). At this time he had some pain at the site of fracture—the deformity was fairly well ankylosed The patient had previously refused operation stating that his pain was becoming lessened as time went on. It

was decided to continue with conservative treatment because of no absorptive changes appearing in the injured segment, as shown by x-ray, and also because of the attempt at ankylosis which was evident He did not at this time present neurological symptoms other than the slight pain below the site of fracture

The x-ray report of Dr Raymond Lewis, dated October 25, 1927, is as follows.

"Stereoscopic antero-posterior and a plain lateral view of the lateral spine show a marked degree of crushing deformity of the body of the second lumbar vertebra The first lumbar vertebra is driven down upon it with an

Fig 238—Case III. Marked compression fracture of the second lumbar vertebra

obliteration of the intervertebral disk and the body of the second vertebra is crushed with the apex directed forward There is a considerable degree of kyphosis at this point There is a marked degree of lipping of the bodies of the fourth and fifth lumbar vertebrae, indicating an osteo-arthritis"

He was fitted with a plaster-of-paris corset on October 24, 1927 The man was advised to return to light work on March 2, 1928 At this time he complained of stiffness and limitation of motion of the lower spine

In spite of his severe injury with deformity he showed *rapid progress* toward repair

Case IV.—On January 27, 1924, patient P K fell from a ladder, a distance of 7 feet, striking his back on an iron pipe He was unconscious for a few minutes, then walked about while waiting to be taken to his home He remained in his bed for four weeks, after which time he was removed to a local hospital where he was treated for five additional weeks by "baking and massage."

At the time the patient was first seen by us March 15, 1924) he complained of marked pain in his lower back Examination revealed point tender-

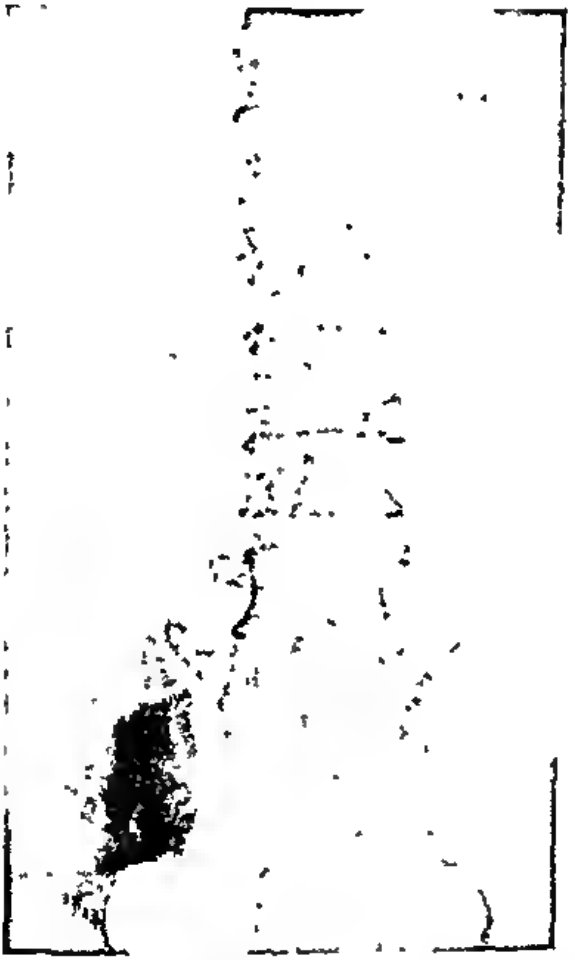

Fig. 239.—Case IV. Fractures of all of the left transverse processes.

ness over all of the left lumbar transverse processes He also had occasional pain in his left chest, especially when breathing deeply

x-Ray examination revealed fractures of the tenth, eleventh, and twelfth ribs on the left side All of the left lumbar transverse processes showed fractures with separations varying from ¼ to ½ inch Moderate osteo-arthritic changes were noted in the lumbar vertebra

The patient was fitted with a plaster-of-paris corset and given physiotherapy daily for about three weeks On June 17, 1924 he was fitted with a Knight spinal brace and advised to return to light work July 1, 1924.

Case V.—On January 3, 1927, A. H., forty-two years of age, was working on a scaffold from which he fell a distance of 28 feet. He was treated at a local hospital for four weeks and then discharged as an ambulatory case.

When first examined by us on February 24, 1927 (about seven weeks after his injury) he presented a slight posterior prominence of the spinous processes of the fifth lumbar vertebra. He also showed a moderate dorsal curve from the ninth dorsal to the first lumbar, this latter curve being vocational in character. There is point tenderness over the fifth lumbar vertebra —in addition, there is definite muscle spasm in the lower back with marked limitation of motion.

Fig. 240.—Case V. Unfortunately this figure does not show the necessary detail.

x-Ray examination revealed marked displacement forward of the fifth lumbar vertebra on the sacrum—a distance of a little more than ¼ inch. The diagnosis was that of "traumatic spondylolesthesis."

On February 25, 1927 with a sand bag placed under the patient's abdomen to reduce the displaced fifth lumbar vertebra, a tibial bone graft was laid between the fourth lumbar and second sacral vertebrae. He was discharged from the hospital on April 15, 1927 wearing a plaster-of-paris corset. This

was replaced by a Knight spinal brace on June 9, 1927 He had been receiving physiotherapy as soon as the operative wound was entirely healed, until he was discharged early in July, and permitted to do light work, which did not require lifting

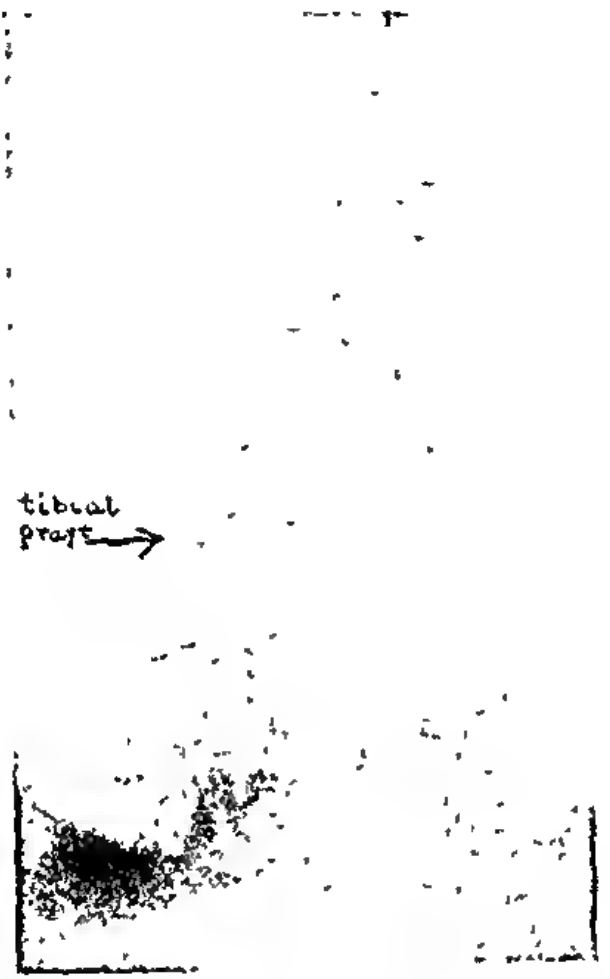

Fig 241.—Case V Showing indistinct outline of the tibial graft to stabilize a "traumatic" spondylolesthesis.

Case VI.—On July 9, 1925, C M , age thirty-eight years, was pushing a wheelbarrow which was well loaded with sand. He lost his footing when he tripped on a gravel walk and fell forward over the wheelbarrow. He said he felt a "click" in his lower back, and has since been disabled.

The patient was examined on October 3, 1925 (three months later). Records show the following "He possesses a 'round back,' with a postural curve in the dorsal region being vocational in character He has very well developed musculature in general He complains of pain and tenderness over the lower part of the erector spinae muscles on the right side The reflexes are apparently normal"

Repeated stereoscopic x-rays were taken before a definite interpretation could be rendered by the radiologist, Dr Lewis Gregory Cole His report is as follows:

"The lumbar spine is tilted to the left, and there is evidence of a lesion involving the fifth lumbar vertebra, with crushing of the anterior-superior margin with new bone production along the anterior border. There is no other evidence of a fracture or dislocation of the lumbar spine or pelvis

"Diagnosis. From a study of these films I believe one is justified in making a positive diagnosis of fracture of the anterior-superior surface of the fifth lumbar vertebra There is some callus production around the site of fracture at the present time I believe that this was a crushing fracture"

A plaster-of-paris corset was made for the patient and after several months of conservative treatment without improvement, it was decided to do a bone graft operation including the fourth and fifth lumbar vertebrae. This was done on January 6, 1926 Unfortunately the patient sat up in bed the day

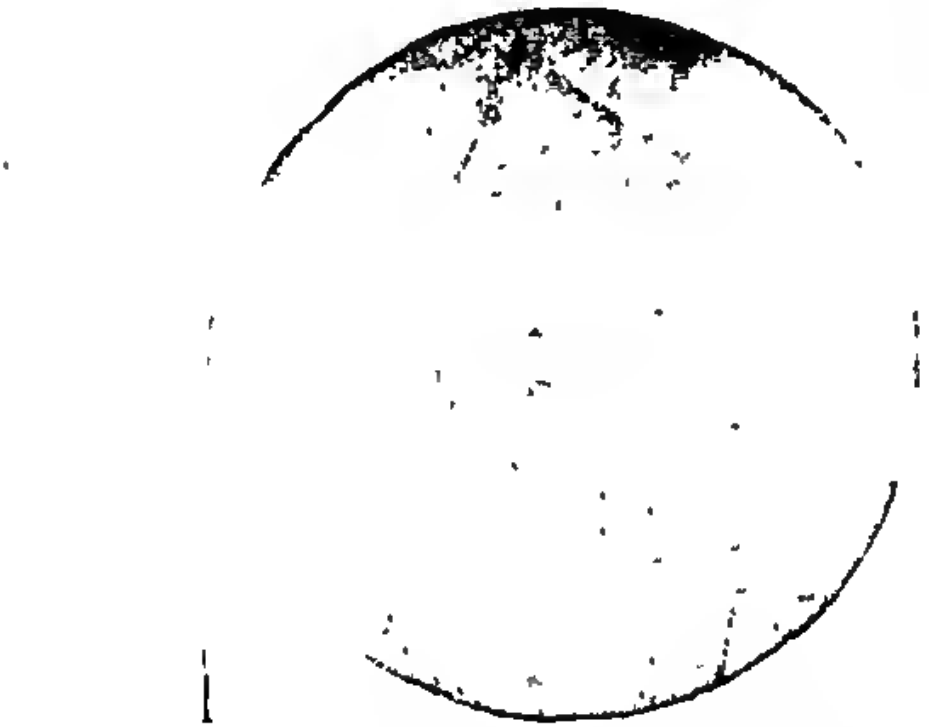

Fig 242.—Case VI Fracture of the anterior-superior surface of the fifth lumbar vertebra

after operation causing the tibial graft to be pushed upward so that the spinous process of the fifth lumbar was no longer adhering to the graft He was discharged from the hospital on February 27, 1926 wearing a plaster-of-paris corset, and feeling very comfortable

Several months later the patient again complained of low back pain probably because of incomplete fusion of the fifth lumbar vertebra directly due to the slipping of the graft

In this instance the Albee graft was used Probably the modified Hibbs-Albee-Forbes operation would have given better results

This case is cited to demonstrate the difficulty of making a diagnosis of a fracture of the anterior portion of the vertebral body of the fifth lumbar vertebra The patient was sent to us as a "malingerer" on account of the

former x-rays being "negative." We were convinced that there was pathology present and went to extremes in demonstrating the same. Our method of operation and after-care are also worthy of criticism and may be helpful to others as they have been to us.

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CLINIC OF DR. IRA COHEN

FROM THE SERVICE OF DR. CHARLES H. LILIENBERG, MOUNT SINAI HOSPITAL

THE RÔLE OF SYPHILIS IN THREE SURGICAL CASES

FOR reasons as varied as the writers on the subject, syphilis does not seem to play as important a rôle in the practice of surgery of today as it did several decades ago. There are times, however, when there is driven home to us the lesson that its existence cannot be ignored in the diagnosis and the therapy of a surgical problem. The 3 cases here reported emphasize this point.

Case I. Syphilitic Osteomyelitis of Ulna, Unoperated, Recovery Under Specific Therapy.—A boy, nine years old, was admitted to the hospital as a case of osteomyelitis because of swelling of a week's duration of the right forearm. One and a half years prior to this he struck his elbow against an iron fence. He failed to report the accident until two days later when he had severe pain in that elbow. For several days he had fever up to 101 F. A Roentgen examination is said to have been negative. From that time until the onset of his present trouble he had been symptom free. The swelling of the forearm was first noted by the boy's mother as a small red area which slowly increased in size. It caused the boy no inconvenience, had not given him any pain, was not tender. His mother stated that he had no fever. The general physical examination was negative. On the posterior aspect of the right forearm just below the olecranon was a swelling about 5 cm. in diameter. It was red but not tender. Superficially it fluctuated, in the depth it was fixed to the bone. No bony irregularity could be distinguished, nor was there any muscular atrophy. There was no limitation of motion at the elbow. The report of the x-ray examination was "the upper third of the ulna is thickened, there are several areas of bone destruction with marked periosteal involvement. The appearance is that of chronic osteomyelitis; luetic osteitis cannot be ruled out (Figs. 243, 244). The swelling was then aspirated, 5 cc. of bloody fluid was obtained. No organisms were seen on spread, none grew on culture. No spirochetae were found. The blood Wassermann was reported four plus. The boy was referred to the dermatological department for antiluetic treatment. Under this therapy the lesion very promptly cleared up. The patient has been seen at the surgical follow-up

clinic. He is symptom free There remains a slight thickening of the periosteum as seen in the x-ray picture taken two and a half years later" (Fig. 245).

The suspicion that the lesion on the forearm was not the usual osteomyelitis was first aroused by the absence of local pain and tenderness. Because of this the swelling was aspirated. Instead of pus, bloody fluid was obtained which failed to show any organisms in spread or culture The roentgenograms were not typical of bone syphilis. Osteitis is usually characterized by

Fig 243 —Appearance of ulna on admission to hospital

a productive reaction both in the bone and the periosteum. This is the picture that most frequently comes to mind when we think of syphilitic bone lesions. We have here, however, a true gummatous osteomyelitis in which there is bone necrosis. Not only was the boy spared a needless operation by the recognition of the nature of the lesion, but he probably would have had a draining sinus for an indefinite period. Even after the diagnosis has been made and the proper therapy instituted this type

of bone does not always respond as promptly or completely as it did in this case. Elsewhere reported a similarly placed in a young woman which did not respond to treatment and which had to be excised and be followed by graft. Even though

Fig. 244.—Appearance of ulna on admission to hospital.

Fig. 245.—Appearance two and a half years after discharge.

eighteen months elapsed between the trauma and the manifest signs of the bone involvement, I believe there was a causal relationship because the injury was pronounced enough to have fixed itself in the mind of the mother and to have required *x*-ray

examination In 116 cases Stokes[2] found that trauma had a bearing in only 25 per cent of the cases

Case II. Acute Right Upper Abdominal Symptoms, Laparotomy Disclosed Broken Down Gumma of the Liver. Recovery.—An unmarried Italian man, thirty-five years of age, came to the hospital complaining of severe pain in the right upper quadrant of his abdomen *No information could be obtained* about his past history He dated the onset of his present illness to five days prior to his admission to the hospital It began with occipital headache, general malaise with pains in the legs, shoulders, and back He had a cough without sputum, pronounced weakness, one chill, and a feeling of feverishness Two days later he first noted a very severe pain in the right upper quadrant The pain remained localized and was constantly present It was not aggravated by taking food, and nothing seemed to relieve it He was nauseated but did not vomit

He looked acutely ill His temperature was 102 6 F The skin and sclera were subicteric He held himself fixed in one position with the right leg flexed on the abdomen Other than the findings on abdominal examination nothing abnormal was noted The upper half of the right rectus muscle was held rigidly and there was pronounced tenderness in the epigastrium Palpation of the remainder of the abdomen caused pain in the right hypochondrium Because of spasm no viscera or abnormal masses could be palpated The following day his temperature rose to 104 4 F. He appeared cyanotic with rapid shallow breathing His chest showed some dulness at both bases with scattered piping râles An x-ray examination of the chest was reported negative The urine showed a faint trace of albumin and was positive for bile The white blood count numbered 16,200 of which 88 per cent were polynuclear leukocytes Blood culture and Widal reactions were negative The van den Bergh was 1 90,000 His blood chemistry was normal With this much evidence it was felt that the man was suffering from an acute cholecystitis or possibly from a slowly perforating ulcer of the stomach On the following day an exploratory laparotomy was performed Through a 5-inch upper right rectus incision the abdomen was opened The gallbladder and the stomach were found free of disease The spleen was slightly enlarged On the anterior surface of the liver, to the right of the midline and about 4 cm from the free border, was a flake of fibrin at which point the liver was loosely adherent to the parietal peritoneum. The liver at this place felt soft. Aspiration yielded brown fluid without odor. This area was completely surrounded by packings and the wound sutured except for 1½ inches of its extent just over the protected liver area The liver was then freely incised and the cavity which contained about 90 cc was emptied by suction Two pieces of rubber dam and two packings were put into the abscess cavity. Culture of the pus was sterile on both aerobic and anaerobic media The same afternoon that the patient returned from the operating room his blood Wassermann was reported four plus

For the first two postoperative days the temperature reached 102 F From the fifth day on it remained normal except for a rise on the twenty-

fourth day to 102 F. (salvarsan reaction) On the seventh postoperative day the wound separated in part down to the peritoneum It was strapped and gave no further trouble The patient was discharged on the twenty-eighth postoperative day with a superficial granulating wound He received antiluetic treatment. One and a half years later when seen at the follow-up clinic he was symptom free. There was slight diastasis of the recti, but no hernia. The Wassermann reaction was negative

This patient presented the picture of an acute infection. There was a history of a chill. He looked very ill and under observation he showed progression of symptoms with increase of fever. There seemed to be little doubt that we were dealing with a condition requiring surgical treatment. The proximity of the lesion to the peritoneal surface of the liver as shown by the fibrin and the adhesion to the parietal peritoneum accounted for the irritative peritoneal symptoms. The possibility of syphilis was not entertained in the preoperative diagnosis; had it been, the question of withholding operation would have arisen. The nature of the lesion was not suspected even after its exposure on the operating table, neither scarring of the liver nor other gummata were seen. The character of the fluid obtained should have given a lead, it was not pus as we generally think of it, nor was it the red-brown color usually seen in liver suppuration. Inasmuch as the fluid was sterile, it is more than probable that the patient would have made a good recovery on antiluetic treatment.

Case III. Repeated Jacksonian Convulsions of Right Arm During a Five-week Period. Craniotomy and Removal of Cortical Tumor-Gumma. Recovery.—A waiter, thirty-six years old, while returning home from work, suddenly felt his right arm become numb and drop lifeless This was followed by tingling sensations which traveled up the arm and finally reached the right side of the face The arm then began to twitch and jerk, the movements being so violent that he used the left arm to hold the right quiet. After a few minutes the jerkings ceased and the arm relaxed After a short interval the movements began again, lasting a few minutes These episodes were repeated several times in the hour between the onset and his appearance at the hospital At no time was there a loss of consciousness. The only noteworthy incidents in the patient's past history were some cardiac decompensation fifteen years previously and a confession of having been a cocaine addict for a period of seven years, the use of the drug having been discontinued five years ago Venereal infection was denied

He was kept under observation for one week, during which time the following facts were noted There was a suggestion of astereognosis in the right hand but no loss of power His tendon reflexes were diminished, there were no pathologic reflexes. The right pupil was larger than the left A slight flattening of the right face was observed at times The blood Wassermann was anticomplimentary, the cerebrospinal Wassermann was negative. It contained three cells, the colloidal gold reaction was negative. It was felt that the patient might have a brain tumor, but there was not sufficient evidence to be *reasonably sure He had no convulsive seizures while in the hospital* He was, therefore, discharged for out-patient observation

Three weeks later he returned stating that he had had a seizure the day following his discharge from the hospital This was similar to the others but involved also his mouth and eyelids It lasted about an hour and left a weakness in the arm which was slow in clearing up A week later he had another attack and the following week a third The last one was associated with aphasia When he entered the hospital this time there was some difficulty in speech, which had cleared up by the following morning There was weakness in the right arm and leg with diminution of the deep reflexes on that side There was *impairment of touch, pain, temperature,* vibratory and postural sense on the right Astereognosis was also present on this side The right pupil was larger than the left, and the left pupil was fixed to light, while the right reacted, though sluggishly The fundi were normal A right central facial weakness was present *x*-Ray examination of the skull showed no abnormality The blood Wassermann was again anticomplimentary The patient was believed to be suffering from a lesion in the postcentral area of the left side, most likely an endothelioma

Eight days after his second admission I performed an exploratory craniotomy Under local anesthesia an osteoplastic flap was turned down on the left side Beneath the unopened dura an indurated area could be felt When the dural flap was made and an attempt made to turn it down, it was found fixed at one place to a growth beneath When this was exposed it measured 2 by 2½ cm It was hard, somewhat nodular and was umbilicated It was situated over the superior parietal lobule. On the surface it was demarcated from brain tissue, but in the depths it merged into brain substance After ligating several large pial vessels running over the surface of the tumor it was readily enucleated In the depths, brain tissue had to be cut to enucleate the growth A dry cavity 2 cm deep was left after its removal The dura was sutured, the flap returned and the scalp sutured The laboratory report of the specimen was gumma

A third blood Wassermann was reported four plus on the following day. There was some slight aphasia for twelve hours after the operation On the eighteenth postoperative day some twitchings were noted in the right arm These were not repeated during the patient's stay in the hospital Five weeks after the operation he was discharged to receive further antiluetic treatment, at which time he had no weakness or speech disturbance When seen nine months later he was working He had had one jacksonian attack in that time He showed some astereognosis and loss of two-point discrimination sense

In this case every effort was made to rule out syphilis. Two blood Wassermann tests were anticomplimentary before one, which was reported after the operation, gave a positive result. Two examinations of the cerebrospinal fluid were negative and the fluid contained but three cells. Had the diagnosis of gumma been made the patient would have been put on antiluetic treatment for a reasonable time. If after six weeks there had been no marked improvement he would have been operated on in spite of a positive Wassermann reaction. This would have been done for two reasons: First, in a certain number of brain tumors a positive Wassermann reaction may be obtained in the absence of any suspicion of syphilis. Moersch[3] reported eighteen positive reactions in 1000 tumor cases. In only four of these could syphilis be seriously considered. Second, not all gummata respond quickly to specific treatment and irreparable damage can be done while pushing this treatment and waiting for results. An idea of the frequency of gummata of the brain can be obtained from Bagdasar's[4] report of 8 cases among 1550 verified tumors in Dr. Cushing's clinic

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CLINIC OF DR. CHARLES J. IMPERATORI

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NONOPAQUE FOREIGN BODIES IN THE BRONCHI

ROUTINE roentgenography, if it were possible, of every ill child's anatomy, from the vault of the pharynx to the tuber ischii, would in many instances show unexpected pathology. A nonopaque foreign body apparently is a very illusive one,

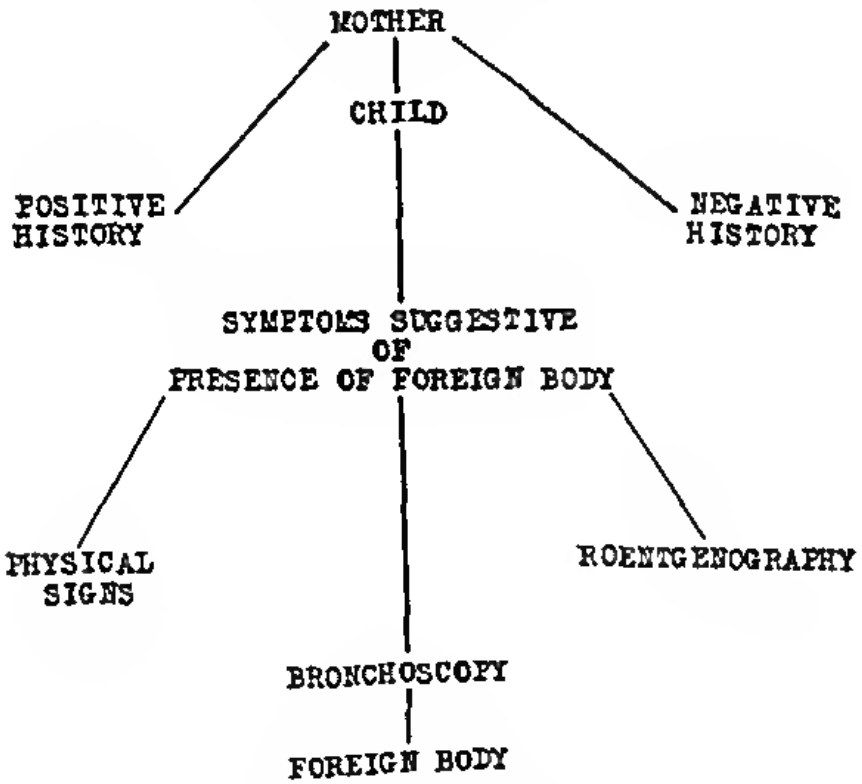

Fig 246.—The relationship of the mother, child, and foreign body, graphically presented.

while in reality in the majority of instances the pathologic changes that it induces in the lung tissue are definite and conclusive. The reactions of the respiratory mucosa to the foreign body, its location and relation to the walls of the bronchi are the factors

that induce the signs that are elicited by inspection, palpation, percussion, auscultation and roentgenography Bronchoscopy is final in determining the correctness of these aids to diagnosis

Among the nonopaque foreign bodies that one has to consider, the following may be enumerated

1 Nut kernels, beans, seeds, thin pieces of wood, gauze drains,[1] etc

2 Bones, meat, animal shells, egg shells, teeth, blood, sea water.

3. Buttons, small celluloid articles, etc

4. Candy, zinc stearate, talc, etc

5. Foreign bodies that ordinarily cast a shadow but because of secretions or length of time *in situ*, etc , are rendered nonopaque.

Fig. 247.—Showing obstructive atelectasis on the right side and compensatory emphysema on the left. The heart and mediastinum are displaced to the right. There is a flattening of the left diaphragm *In situ* three days

Fig 248.—Twenty-four hours after removal of foreign body. The foreign body was a steel ball and completely blocked the bronchus. It was *in situ* only twenty-four hours, hence the prompt return of the lung tissues to nearly normal A nonopaque foreign body would have produced essentially the same condition, but the local reaction would be more intense

the determining factor, whether there is found on roentgenography and physical examination, obstructive atelectasis, or obstructive emphysema. In obstructive atelectasis there is always compensatory emphysema of the opposite lung. An explanation of these terms will help materially in the understanding of the illustrations In obstructive atelectasis, such as shown in Figs. 247, 248, the foreign body is blocking completely the right main

Fig 249.—Obstructive emphysema of the right side The heart and mediastinum are displaced to the left There is flattening of the diaphragm The right side shows a greater transparency than the left, due to the trapped air within the lung The foreign body was a grape The roentgenogram was taken at the end of expiration *In situ* thirty-six hours

bronchus The result is an absorption of the residual air in the lung, a collapse of it and because of the negative pressure in the right chest, the displacement of the mediastinum and heart to the right. On fluoroscopy there is no lateral movement of the heart and mediastinum. There is a compensatory emphysema of the left lung, for it alone is the functioning lung. Obstructive emphysema is illustrated in Fig. 249; there is a hyperaeration

of the right lung with flattening of the diaphragm and the opposite lung has a lesser transparency than the invaded one. The obstruction is in the right main bronchus and is caused by a grape acting as a check valve to expiration. The result is a trapping of the inspired air within the right lung. On fluoroscopy the heart and mediastinum move from side to side, and in this instance the heart and mediastinum are displaced to the left, that is, the uninvaded side

Dr. Manges of Philadelphia originated this observation. These roentgenograms should be taken at the end of expiration.

Fig 250 —Infiltration and fibrotic changes in the left lung Gauze drain, 8 inches long, removed from lung substance through a small bronchial fistula, *In situ* over three years

I am certain that in a great number of instances that the whole value of roentgenograms has been missed because of improper technic and the failure to make the exposure at the proper time.

Foreign bodies in the bronchi may become dislodged and enter the trachea Necessarily, they have to pass through the trachea when inspired Consideration must be given them. An impacted foreign body in the trachea may induce coughing,

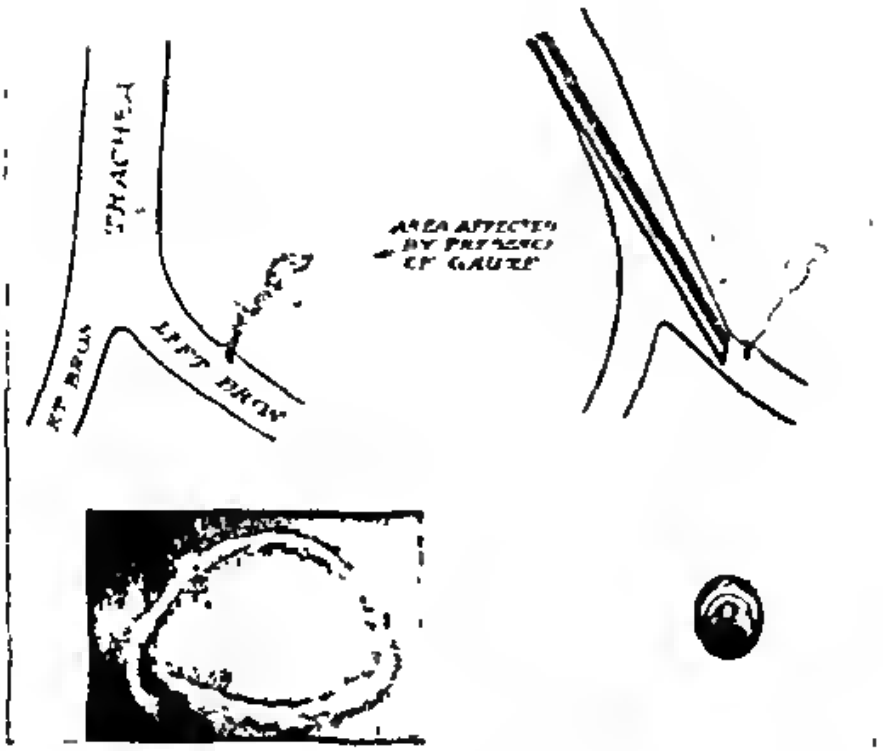

Fig 251 —Foreign body Diagrammatic location of foreign body.

Fig. 252 —Fibrotic changes in the right middle and lower lung of a two-year-old child Unsuspected sliver of bone that was removed bronchoscopically *In situ* unknown length of time.

gagging, dyspnea or cyanosis. One or all of these signs may be present. Usually there is less discomfort to the patient from a fixed foreign body provided it does not block the airway. On palpation over the larynx, at times over the sternum, and even on the chest, the palpatory thud may be elicited. The audible slap is heard on expiration, the patient having the mouth open.

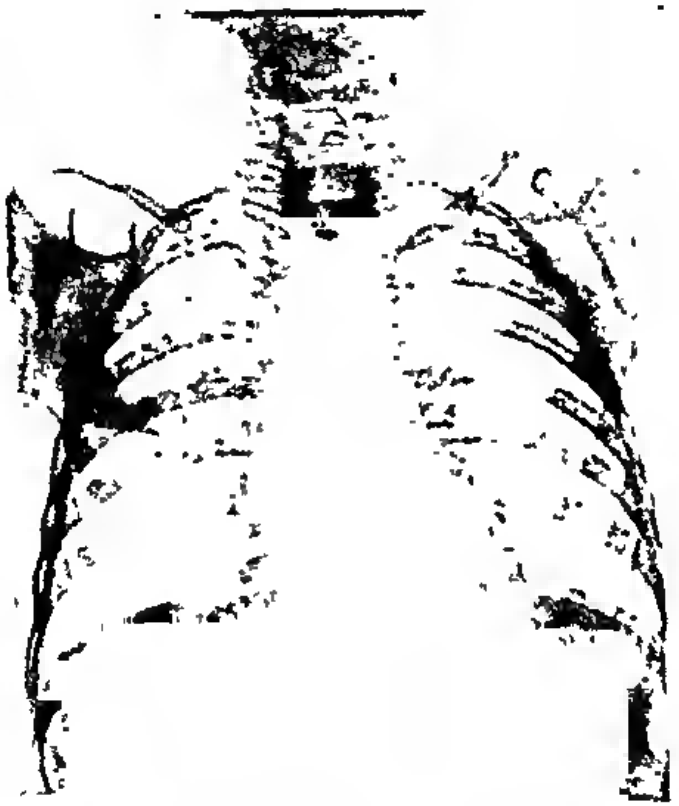

Fig 253.—Peanut in right main bronchus opposite the upper lobe branch. Infiltration of right upper lobe. Peanut removed by bronchoscopy. There was no secretion behind foreign body and air almost completely surrounded it. The bronchial mucosa was irritated where the foreign body plugged the upper lobe branch bronchus, thus giving the pathology in the upper lobe. *In situ* five days.

The asthmatoid wheeze is heard with the ear at the patient's mouth. The tracheal flutter has been heard on auscultation over the trachea in cases of watermelon seeds or thin light objects.

As important as any physical or roentgenographical examination, is the proper inquiry into the history of the patient under consideration. A proper estimation of the patient's symptoms,

and, if a child, attention to the parent's or nurse's detailed story must be regarded and not set aside as of no importance It is time to disregard the history only when a regular routine physical, roentgenographical and bronchoscopical investigation has proved negative Too frequent disregard of the mother's observation of her child having choked on something and later followed by indefinite symptoms, has resulted in serious lung pathology Improperly interpreted or poorly taken roentgenograms lead to false conclusions

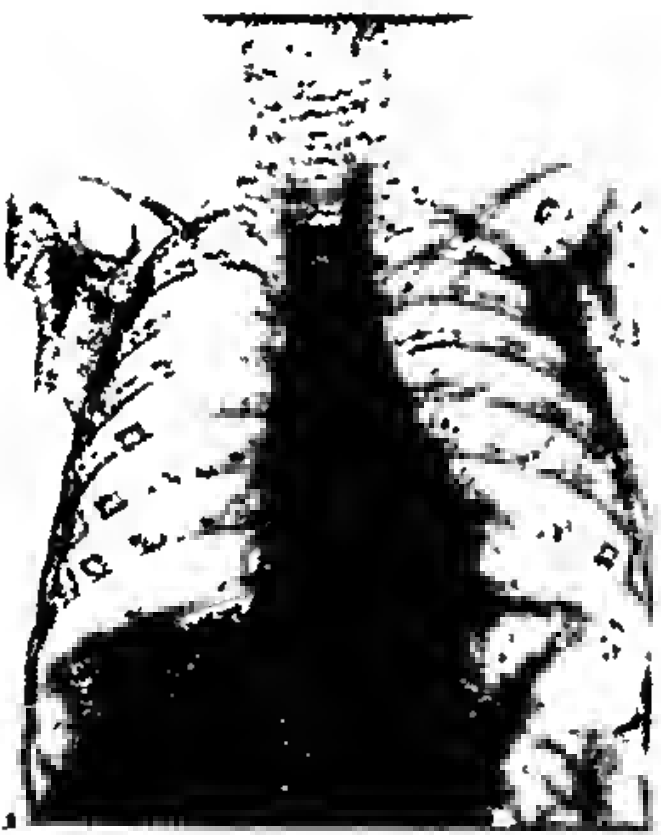

Fig 254.—Roentgenogram taken five days later of patient shown in Fig 253

Any patient with a chest condition not positively determinable by physical signs or by roentgenography, should be bronchoscoped

Little, if any, lung pathology remains after removal of foreign bodies Obliteration of the airway at the site of lodgment with the subsequent induction of suppurative and fibrotic changes in the lung are more common when the foreign body is a vegetable or animal substance These changes as a rule take some time.

Excepting in very rare instances, unremoved foreign bodies produce bronchiectasis, broncholithiasis, lung abscess, and fibrotic changes. If a foreign body is of such size to completely block a bronchus, immediate symptoms and pathology of lung

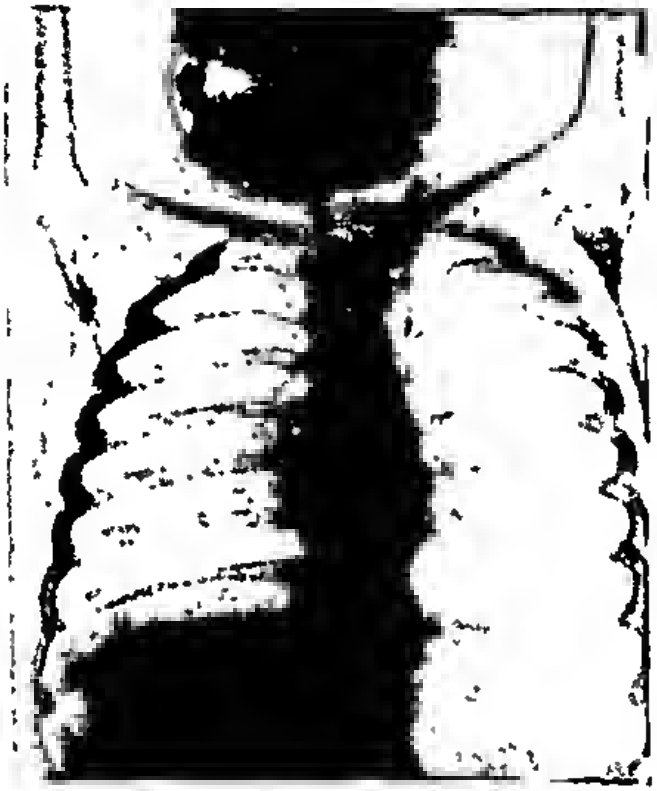

Fig 255 —Peanut in left main bronchus, removed by bronchoscopy. Obstructive emphysema in left lung with some increased density of right, but the roentgenograms were not taken at the end of expiration and a central pneumonia was suggested There was a stricture in front of the foreign body and bronchiectasis where the foreign body was. This case was properly diagnosed by the pediatrician and misdiagnosed by the roentgenographer However, the pediatrician suggested as follows "I gave her (the mother) ephedrol cough mixture and suggested that the child be turned upside down frequently, hoping that the foreign body might be dislodged with relaxation of the bronchial musculature However, if the child's condition does not clear up within the next few days, I think he ought to be bronchoscoped" Certainly a very good thought, but what a commentary on the doctor's general knowledge of 1930 surgery *In situ* six weeks Compare with Fig 249.

obstruction and collapse supervene The lung pathology is dependent on the degree of bronchial obstruction, the length of time *in situ*, and the physical characteristics of the foreign body

In my experience, the peanut depends for its violent reaction on its size, and the size of the bronchus in which it is located. Small peanuts that have been lodged within a bronchus for days and even weeks have shown very little lung pathology on

Fig. 250.—Peanut in right main bronchus. Roentgenogram negative. This child had been exposed to whooping cough and the signs and the cough were diagnosed as possibly the onset of the disease. The mother, who had read an article by Dr. Jackson in Hygeia, insisted that the child's symptoms all dated from the time she choked while eating peanuts. She had also heard of the death of a child following the inhalation of a peanut. Roentgenograms taken in her home town were negative. Roentgenograms taken at our own hospital were reported as negative. On bronchoscopy the peanut was seen and removed. There was a very slight amount of infiltration of the mucosa of the bronchus where the peanut was located. Air almost completely surrounded the foreign body, hence the small amount of bronchial pathology and absence of x-ray findings. *In situ* five days.

roentgenography. Several peanuts have been removed recently and the roentgenographical findings were negative. These peanuts were small and there was plenty of air around most of them. The last patient from whom I removed a peanut, had it *in situ*

a week and the roentgenographical findings were negative. This peanut was behind a small annular mound of granulations that encircled most of the bronchus. There was no movement of the foreign body, and on removal it crumbled into eight pieces. The local reaction, except for the stricture, was very slight. Possibly within a short time further signs, such as obstructive emphys-

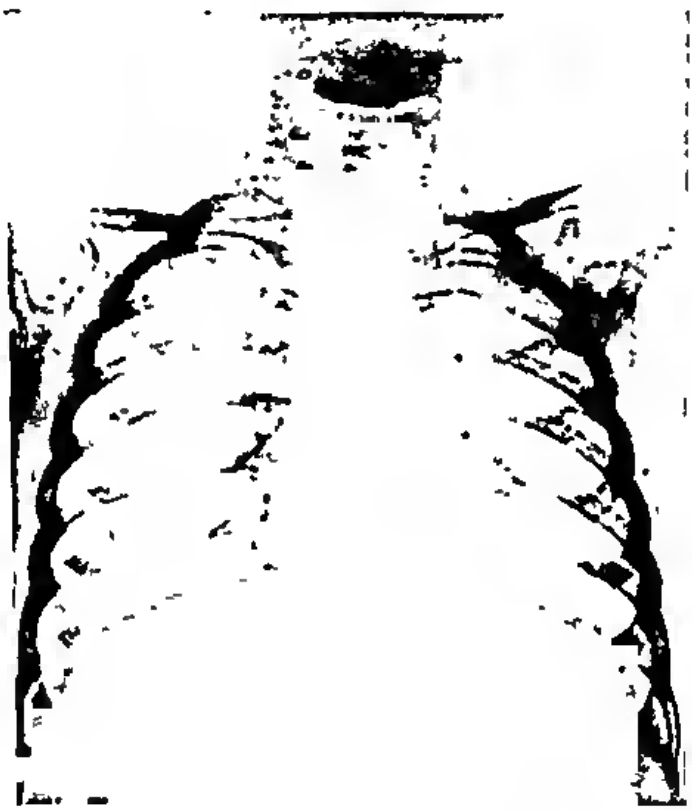

Fig 257.—Peanut in right main bronchus. Roentgenogram negative. Length of time *in situ*, twenty-four hours, is very likely the reason, in this particular case, for not giving definite signs roentgenographically. Bronchoscopy done because of history given by mother that the child choked while eating peanut candy. Considerable secretion behind foreign body which almost blocked the bronchus.

ema, would have developed. The physical signs on auscultation were sonorous râles over the right main bronchus.

Any of the elicited physical signs or roentgenographical findings are of great importance when positive. If negative but where a positive history of foreign body inhalation is given and there are undetermined causes for the patients' symptoms, such as cough and temperature, bronchoscopy should be done.

Dr. Thomas McCrae summarized the physical signs incident to foreign bodies in the bronchi as follows.

"There is no one description of physical signs which covers all cases. If the student will remember that complete obstruction of a bronchus leads to a shutting off of this area, there should be little difficulty in understanding the signs present. The diagnosis of empyema may be made, but the outline of the area of dulness, the fact that there is no shifting dulness, and the greater resistance which is present in empyema nearly always clear up any difficulty promptly The absence of the frequent change in the voice sounds, so significant in an early small empyema, is of value A large empyema should give no difficulty. If difficulty remains, the use of the needle should be sufficient In thickened pleura vocal fremitus is not entirely absent, and the breath-sounds can usually be heard, even if diminished In cases of partial obstruction of a bronchus, it is evident that air will still be present, hence the dulness may be only slight The presence of air and secretion will probably result in the breath-sounds being somewhat harsh, and will cause a great variety of râles, principally coarse, and many of them bubbling Difficulty may be caused by signs in the other lung or in a lobe other than the one affected by the foreign body If it is remembered that these signs are likely to be only on auscultation, and to consist largely in the presence of râles, while the signs in the area supplied by the affected bronchus will include those on inspection, palpation, and percussion, there should be little difficulty "

Dr Chevalier Jackson has further epitomized these signs as follows

"1 Limited expansion

"2 Decreased vocal fremitus

"3 Impaired percussion note.

"4. Diminished intensity of breath-sounds distal to the foreign body "

Summary of Diagnostic Signs and Methods.—1 History of foreign body inhalation or of any operative procedure, particularly a tonsil operation Accompanying symptoms, such as gagging, coughing, wheezing, choking, dyspnea, and cyanosis.

2. Type of foreign body and a study of its nature as to size, shape, consistency, and composition.

3. Length of time *in situ*. Length of time of symptoms referable to present condition. Present symptoms, cough, expectoration, loss of weight.

4. Physical signs.

5. Other signs, clubbed fingers, sweats, temperature.

6. Blood picture, possible eosinophilia or leukocytosis. Culture from throat—diphtheria.

7. Roentgenographical findings. Repeated in the face of negative findings where there is a definite history of foreign body inhalation.

8. Bronchoscopical examination.

CLINIC OF DR. MORRIS K. SMITH

From the Thyroid Clinic and Surgical Services of St. Luke's Hospital

THYROID CASES

Adenomatous disease of the thyroid causing symptoms from pressure on the trachea or recurrent laryngeal nerve are not rare but doubtless often overlooked, particularly in regions where thyroid enlargements are not endemic. The two patients whom I am first presenting to you are excellent illustrations of this condition.

Mrs. M D, sixty years of age, presented herself because of difficulty in breathing and hoarseness (Fig 258). Six months previously she first noticed swelling in the neck For the past two months she had had a sense of suffoca-

Fig 258.—Mrs. M D A soft fulness on the right side of the neck was due to adenomatous enlargement of the right lobe of the thyroid which caused deviation of the trachea, hoarseness, and difficulty in breathing

Fig 259.—Mrs M D. x-Ray showing trachea pushed over to the left

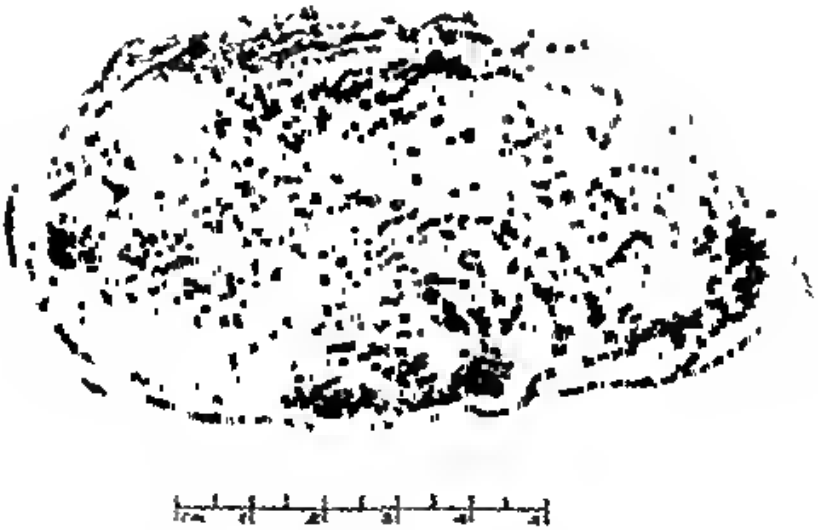

Fig 260.—Mrs M D. Specimen removed. A soft adenoma of the right lobe of the thyroid

tion at night, and for the past two weeks hoarseness. The history was otherwise irrelevant. She was a stout healthy appearing elderly woman. There

was a soft fulness of the right side of the neck rather higher than the usual thyroid enlargement so that some question was raised as to its character, although goiter seemed to be the most reasonable explanation. The trachea was pushed well over to the left as the x-ray demonstrates (Fig. 259). Examination of the larynx showed paralysis of the right vocal cord.

She was operated upon in a semisitting position, owing to the orthopnea, under local anesthesia. The left lobe was not enlarged. The right lobe was replaced by a large soft adenoma which extended back of the trachea Operation consisted in removal of the adenoma (Fig 260). Convalescence was uneventful, the patient was relieved of her dyspnea and two and one half months later at a follow-up examination in the thyroid clinic it was found that her voice had returned Examination at this time showed normal function of the right cord.

Mrs I J , thirty-seven years of age, entered hospital because of increasing difficulty in breathing She first noted a swelling in the neck sixteen years ago. It had gradually reached its present size She was first seen at the thyroid clinic one year before, at which time she had pressure symptoms but did not wish to be operated upon Since then she had developed attacks of

t and
diffi-

"asthma." She had to sleep with head and shoulders well elevated There were no toxic symptoms She was a large vigorous appearing woman of Swedish birth weighing about 200 pounds There was a well-marked adenomatous enlargement of the right side of the thyroid extending into the thorax with deviation of the trachea to the left x-Ray confirmed the lateral displacement of the trachea and showed in addition a marked forward curvature and compression (Figs 261, 262) The basal metabolism was +4 per cent

The patient was operated upon under local anesthesia The enlargement of the thyroid was found to be wholly due to an adenoma of the right lobe

Fig 262.—Mrs I J Lateral x-ray showing marked compression of trachea

which offered some difficulty to removal because of its friable consistency and thin capsule During the elevation of the goiter the patient suddenly became hoarse, it being noted at the time that it had not immediately followed application of a clamp Subsequent laryngological examination was reported as follows "Slight paresis of left cord with a little overactivity of the right, no evidence of paralysis" It was a matter of surprise that the nerve traumatized should be the left whereas the operation was confined to the right lobe of the thyroid It would seem that the adenoma extending down back of the windpipe and toward the left side must have become adherent to the left recurrent nerve.

The patient's breathing was relieved at once by the operation. When last seen two months later she stated that when calling out to her children some days previously she suddenly found that her voice had come back. Examination of the larynx at this time showed the left cord to be thickened but moving well. There had been no "asthmatic" attacks since the operation, although it is too soon to say whether these attacks were wholly due to the tracheal obstruction.

Comment.—These patients have been presented to demonstrate the gratifying relief offered by surgery and to emphasize the importance of examining the thyroid patient for tracheal

Fig 263.—Mr G S This patient came to hospital because of attacks of tachycardia There was no visible goiter in the neck x-Ray shows intrathoracic goiter with deviation of trachea to left.

deviations and compressions This includes a determination of the presence or absence of intrathoracic goiter which it must be recalled may exist with little or no visible thyroid enlargement (Fig 263) Such an examination is not complete unless it includes fluoroscopic or *x*-ray study.

One often sees in the presence of goiter a degree of displacement of the trachea which gives the patient little or no symptoms. Such a condition is a definite indication for advising surgical intervention as a prophylaxis against a more serious obstruction in the future

There is not infrequently an association of mental disorders and hyperthyroidism and the question of the effect of surgical cure of the hyperthyroidism on the mental state is of much interest. Dr. DeCourcy in an article on Toxic Goiter and Mental Disease[1] reported operations on fourteen mentally unbalanced patients with toxic goiter All but two patients completely recovered.

Mrs M G, a Jewish woman, thirty-nine years of age, was admitted to hospital November, 1928 She dated her illness to an emotional shock three years before when the ceiling fell on her daughter and herself and she thought

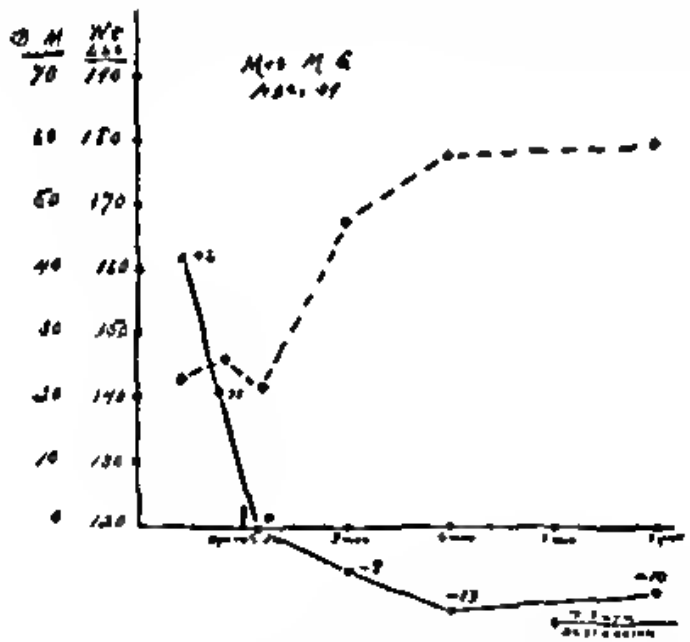

Fig 264—Mrs M G Exophthalmic goiter with mental depression Chart to show basal metabolism and weight curves just preceding and after operation Solid line basal metabolism, interrupted line weight Immediately following operation her depression cleared up and was succeeded by a state of happiness at her improvement which again gave way to depression after nine months Her weight was maintained and metabolism continued low.

that the daughter had been killed Since then she had had symptoms of hyperthyroidism, nervousness, palpitation, weakness, irritability, intolerance of hot weather, but she emphasized particularly mental depression She

[1] Archives of Surgery, vol 17, pp 296–303, 1928

cried easily and "most of the time" There had been short remissions. She had lost 13 pounds. On examination she presented slight exophthalmos, moderate uniform thyroid enlargement, pulse rate of 100 and basal metabolism +42 per cent.

The patient was operated upon in an iodine remission and a subtotal thyroidectomy done. Convalescence was uneventful. The hyperthyroidism was relieved and the patient gained weight rapidly. Mentally she was on the crest of the wave for the cure which she had obtained after so long a period of ill health and depression This happy state of affairs lasted for nearly a year. She then began to experience a return of her nervousness, depression, and insomnia which has now been present for two months A basal metabolism made to determine whether there was any recurrence of hyperthyroidism was normal, −10 per cent, while she had maintained her gain in weight (Fig. 264).

Comment.—The conclusion seems justified that this woman has a mental condition that oversteps the limits of normal and that has not been permanently cured by the cure of her hyperthyroidism.

The next patient I wish to present to you was under observation in hospital with symptoms which were not attributed to hyperthyroidism at the time, on account of the inconclusiveness of the syndrome and a basal metabolism only slightly above normal, but whose subsequent course was the development of a clear case of Graves' disease, so that it seems certain that the disease had already begun when she was first studied. This patient is one of several similar cases that we have had under observation and indicates on the one hand that symptoms may appear before there is much elevation of metabolism and on the other hand that in the presence of suggestive clinical evidence of the disease a doubtful elevation of the basal metabolism alone should not certainly rule out the diagnosis.

Mrs L A , forty-six years old, of Scandinavian origin, entered St Luke's Hospital in May, 1929 complaining of shortness of breath, precordial pain, palpitation, some swelling of ankles, vague abdominal discomforts, and nervousness She had also had some blood-tinged sputum. The illness was described as of three months' duration The last month she had spent mostly in bed She had a history of rheumatic fever twenty-two years before and was found on examination to have chronic cardiac valvular disease. In addition the examiner noted that the patient was somewhat flushed and had a fine tremor We made a tentative diagnosis of rheumatic heart disease and questionable hyperthyroidism A basal metabolism one week later was

+14 per cent, which seemed to rule out the suspicion of hyperthyroidism, particularly in view of the heart She remained in hospital about two months complaining at times of pains in the joints, abdominal discomforts and nervousness Vomiting was not infrequent and insomnia and excitability were recorded in the nurse's notes She was discharged with the diagnosis of chronic cardiac valvular disease

Some time after leaving the hospital she went to the family physician who put her on iodine with temporary improvement In December, about four months after leaving hospital she was readmitted She presented at this time exophthalmos and moderate thyroid enlargement There had been 10 pounds weight loss since the last admission, making a total of 25 pounds for the past year (This weight loss was not recorded in the previous history.) She was nervous, perspired profusely at night and complained of feeling generally miserable The blood pressure which had been 120/68 at the previous admission was now 145 100 Her basal metabolism was +41 per cent with pulse of 110

Under Lugol's solution and rest she improved markedly and went through a subtotal thyroidectomy without incident On discharge the basal metabolism was −2 per cent, pulse 64

Comment.—In this patient's first admission the heart condition seemed to explain her symptoms, especially with a basal metabolism of only +14 per cent The subsequent course of events indicates that the heart was suffering from the thyroid load and that the presence of old valvular disease obscured this condition. Whether with the evidences of hyperthyroidism which she presented at that time one would have been justified in doing radical surgery is a harder question to answer In this particular case it would have saved her several months' progressive ill health On the other hand neurotic states can so mimic Graves' disease that one feels safer to have a definite elevation of metabolism before advising surg

The next patient illustrates nce of Graves' disease after a satisfactory operative three years.

lobe was removed. The procedure was much less radical than that we practice today. The pathologic report was hyperplasia of the thyroid exophthalmic type Convalescence was uneventful and she was discharged from hospital with a basal metabolism of +2 per cent.

She returned directly to her family of six children and as their circumstances were straitened her burdens were heavy. About a year after operation the basal metabolism was −8 per cent and weight 158, a gain of 18 pounds. One year and a half after operation her seventh child was born. She continued to feel well until over three years after operation when, following extraction of a tooth, she became nervous and irritable. During the succeeding

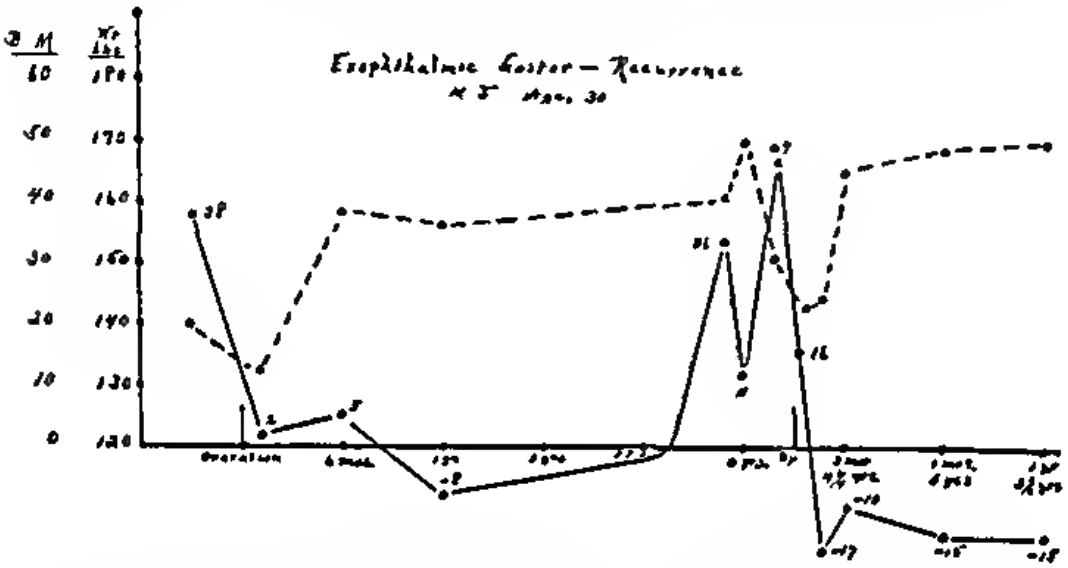

Fig. 265.—Mrs M. J. Exophthalmic goiter. Well more than three years after operation, then return of Graves' syndrome with recurrence of thyroid enlargement. Second operation. Solid line, basal metabolism, interrupted line, weight.

year she was not well, her pulse became rapid and the remnant of thyroid so enlarged that she had an easily visible goiter by the end of the period. Three metabolism tests during the year were +29 per cent, +10 per cent, and +35 per cent She was tried on iodine without permanent result. Her weight was relatively well maintained until just before admission for her second operation in February, 1929, four and one half years after the first operation and a little over a year since the onset of what might be termed a second attack of the disease

At this entry to the hospital her metabolism had risen to +47 per cent. She was prepared with Lugol's solution. At operation a large amount of thyroid tissue was found and removed, leaving a small remnant. The pathologic report was hyperplasia of the thyroid.

The metabolism on discharge was −17 per cent. She has done well to date of last examination, one year postoperative (Fig. 265).

Comment.—There are several points of interest in this case. She did very well following an operation that at present we would

consider inadequate, and in spite of the fact that she had no proper convalescence before returning to hard work. Her symptoms began again after three years of good health. For more than a year she kept on feeling poorly. Toward the end of this time the enlargement of the thyroid remnant was noted. Fortunately, although remissions and exacerbations in Graves' disease are frequent, recurrences such as this are not common after operative treatment Dr Plummer reports approximately 6½ per cent of cases diagnosed pathologically as diffusely hypertrophic goiter coming to thyroidectomy a second time in The Mayo Clinic.[1]

The last case which I wish to present to you is one of the group which are clinically benign adenomata and pathologically malignant.

Mrs M B, forty-five years of age, entered the hospital in July, 1925 She had had a slowly enlarging goiter for twenty years For the past six months her voice had been husky and she had had a cough. She was nervous at times There had been no weight loss noted and no cardiac symptoms On examination she was a thin woman with an irregular firm thyroid enlargement, the left lobe being described as the size of a lemon and the right one half as large The trachea was in the midline The pulse rate was 92 There was no tremor nor exophthalmos Basal metabolism was +47 per cent There was a definite anemia, hemoglobin 48 per cent, red blood cells 3,488,000

At operation three encapsulated adenomata, one from the right side and two from the left were enucleated Both the preoperative and postoperative diagnosis was toxic adenoma of the thyroid

The report of the pathologist, carcinoma of the thyroid, came as a surprise I quote from Dr Knox's description "Sections from all three tumors show that they are all very cellular, a medullary type of growth, with only a few acini Occasionally vesicles are found containing colloid material, but these are infrequent Occasionally also there is a glandular arrangement of the cells, but in most areas they are growing without restraint in the form of large sheets The size of the cells varies considerably, being small in some areas, very large and irregular in others Some of the nuclei are multiple and many are hyperchromatic Mitoses are not extremely numerous Some of the vessels contain or are lined by cells which appear to be tumor cells (Fig 266) The capsule is extremely thin and is probably invaded Morphologically the tumor must be considered malignant"

The patient made an uneventful convalescence She was last examined nine months after operation and was then found to be well and much pleased with the result Thereafter the patient moved away and could not be gotten back to the return clinic A letter from her in December, 1929, nearly four

[1] Jour Amer Med Assoc, vol. 91, p. 122, July 14, 1928

and a half years after operation, makes no mention of her neck but stated that she had not been very well and had had an appendectomy. This patient did not have radiotherapy.

Fig 266.—Mrs. M. B. Goiter, clinically toxic adenoma, pathologically carcinoma

Comment.—The subject of thyroid malignancy is confusing because in addition to those apparently malignant on clinical examination or at operation there are a group of cases such as the one just described not suspect
pathologic report. Furthermore
carcinomata is often very difficult. Allen Graham[1] in studying this problem came to the conclusion that the most constant single indication of epithelial malignancy of the thyroid is invasion of the blood vessels.

[1] Surg., Gynec., and Obst., 39, 781, 1924.

Of thyroid cases coming to operation approximately 2 per cent show malignant disease. It is pretty well agreed that adenomata serve as the origin of cancer in a considerable proportion of cases, Graham and others of large experience placing the figure at about 90 per cent

When malignant disease of the thyroid can be diagnosed clinically it is agreed that the outlook for a surgical cure is extremely unfavorable and many feel that radiotherapy alone should be used. Our experience with the surgery of readily apparent thyroid cancer confirms the opinion that it has little to offer.

Are the cases whose malignancy is unrecognized until microscopical examination to be regarded with a corresponding pessimism?

In studying our cases of thyroid cancer they fall into two groups, sixteen in whom the diagnosis was apparent clinically or at operation and eight in whom it was first diagnosed by the pathologist With the latter may be considered thirteen more who were considered pathologically as suspicious of malignancy

Of the group of 8 cases first diagnosed by the pathologist there is unfortunately a late record on only three due mainly to the fact that a number were operated on before the institution of a follow-up system Of the three one is the case described above, not recently examined but known to be living four and a half years after her operation A second case was treated for three years with radiotherapy but has since passed from observation. The third is living nearly five years postoperative. Two years after her operation she was found to have what was thought to be an inoperable recurrence in the left lobe. Since then she has had radiotherapy The recurrence is not now apparent. She has symptoms of myxedema

Of the thirteen patients regarded as pathologically suspicious of malignancy there are follow-up records on only six. Of these one came to autopsy a year and a half later with metastases in mediastinum and vertebra. The other five are well, although the period of follow-up in several cases is short. One of these patients

developed symptoms of hyperthyroidism about a year after the removal of the suspected thyroid tissue. She was operated on a second time. There was no suggestion of malignant disease found on this occasion.

These few cases would suggest that malignancies of the thyroid found only at pathologic examination do not carry a very bad prognosis. I have looked over some of the more recent articles on thyroid cancer in the hope of getting a clearer answer to the question of their prognosis. Many of the writers do not list end-results in this group separately but there are a few who throw light on it. Balfour[1] reported that of the cases of carcinoma within an adenoma 69 per cent were alive without recurrence. He does not say how many of these cases were recognized by the surgeon but this group must include those which were discovered first by the pathologist. Herbst[2] in a later study from The Mayo Clinic said that 47 per cent of patients with encapsulated tumors were reported free from recurrence. Pemberton of The Mayo Clinic[3] stated that the surgeon was unaware of the malignancy in 31 per cent of cases but does not supply separate end-results for this group.

DeCourcy[4] reported among 850 thyroidectomies for adenomatous goiters carcinoma found microscopically in 12 and pronounced doubtful in 8. Of the 12, 2 had recurrences in two years. Of the 8 doubtful cases, one had recurrence. Of these three occurrences two were already dead. The remaining 17 were living and free from recurrence one or more years.

Clute and Smith of the Lahey Clinic[5] reported that of 54 patients with malignancy of the thyroid submitted to operation in 11 the diagnosis was unsuspected before the pathologic report. Of these 11 the outcome in one is unknown, three are dead, and 7 are living and well. Four of these seven, however, had been operated upon within a year.

[1] Collected Papers of The Mayo Clinic, x, 373, 1918
[2] Ann Surgery, 79, 488, 1924
[3] Ibid., 87, 369, 1928
[4] Ibid., 80, 551, 1924
[5] Archiv Surg., 18, Part 1, 1, 1929.

Coller[1] stated that it is the adenomata with contained neoplasm which cannot be diagnosed clinically as carcinoma that are of great interest since a cure can often be affected by their removal. In this group who have passed the three-year period 40 per cent are dead of recurrence and metastasis. Forty-seven per cent of the series of 90 cases were not suspected clinically of cancer.

In conclusion thyroid cancer when it can be recognized clinically offers little hope of surgical cure Whether or not such as are recognizable by the surgeon at operation, although not by the clinician, form an intermediate group as regards prognosis I have thought it best to class them with those recognizable clinically, as contrasted with the group of carcinoma encapsulated within an adenoma and recognized only on pathologic examination. This latter group would seem from figures available to show a three-year cure in at least half the cases A secondary more radical removal of thyroid tissue does not seem advisable when the diagnosis is received

[1] Jour Amer Med Assoc , 92, 457, 1929

CLINIC OF DR. EDMONDE D. NEER

NEW YORK CITY HOSPITAL

AN ESTIMATION OF THE SUBCORTICAL MASTOIDECTOMY

BECAUSE of the recent appearance in the literature of extensive descriptions of a new mastoid operation, many inquiries have come to the Otologist regarding its application. This new operation is designated the "subcortical," because most of the external cortex is preserved, the approach being made through the anterior wall of the mastoid by way of an incision through the posterior wall of the external auditory meatus.

In performing the operation the head of the patient occupies about the same position on the table as in the usual open method, the Schwartze operation. A small triangular incision is made in the posterior wall of the membranous canal and the enclosed tissue dissected out and discarded. The soft parts are further freed by a periosteal elevator and small retractor inserted. A burr is then used to penetrate the cortex of the anterior surface of the mastoid, and this perforation is enlarged sufficiently to admit a curet and the mastoid cavity is emptied through this keyhole opening. The curetting is performed in a laborious manner, owing to the method of approach. This method affords no opportunity of removing cells far forward in the zygomatic region, nor far back in the postsinus region; nor the deep tip cells. The external cortex is not removed, unless it has been perforated by a subperiosteal abscess. After all cells that can be reached have been removed, drainage is carried on through the wound in the posterior part of the external auditory meatus. This incision or entrance into the mastoid is about on a level with the antrum of the mastoid, therefore drainage is not favored

by gravitation through the lowest part of the mastoid cavity, there is no postauricular drainage whatever, as no postauricular incision has been used.

The advocates of this operation attempt to justify it on the following grounds: first, that better cosmetic results are obtained as no posterior incision is used; second, that the cortex is preserved and the healing period shortened; third, that injury of vital structures is more readily avoided; fourth, that the prevention of recurrent or secondary mastoiditis is assured; and many other unwarranted claims.

In answering the inquiries, the reply to the general practitioner, the pediatrist and others, is based upon the well established principles of general surgery. Our purpose then is to review the claims made for this new operation and to show its inconsistencies. This method of entering the mastoid, namely, with the dental burr, is by no means new; it was introduced in mastoid surgery by Jasser in 1776, and subsequently abandoned as a dangerous procedure. It has not been practised since by otologists who study the anatomy and surgical variations of the mastoid This so-called new operation has not been accepted by well informed otologists and has obtained no recognition from this special field of surgery

Mastoid surgery is different from all other surgery and different from other bone surgery, owing to the fact that the pathology is encased in one of the most dense bones of the body, the temporal bone The mastoid process constitutes the base of the petrosal portion of the temporal bone, and its density varies, but often it is highly eburnized and the degree and extent of mastoiditis is often baffling to diagnose In fact, serious mastoiditis is sometimes overlooked, because of this dense type of mastoid and the ability this very dense bone has to conceal symptoms. The first symptoms of such a case may be some complication, as brain abscess or meningitis, the mastoiditis having been in slow progress for several months To illustrate by a case:

A laborer, forty-three years of age, was admitted to the hospital with marked word aphasia and loss of power in the right upper and lower extremities and slight loss of memory and marked changes in personality In the

year preceding his admission to the hospital, he lost 40 pounds reducing his weight to 160 pounds. There was no history of previous illness, he had been vigorous and active until January, 1926 when he had influenzal sinusitis and a left middle ear which discharged for three months, but no mastoid symptoms This patient was unable to resume work and continued to fail throughout the next year. Eighteen months after the onset of his influenza, discharge again appeared from the left ear with left side head pain, the left mastoid was opened, revealing an old mastoiditis with a necrotic tract extending to the dural plate Very extensive exposure of the middle fossa showed an abscess in the middle fossa, in the sphenotemporal lobe about ½ inch below the surface; 3 ounces of thick heavy pus was drained from an old, organized, thick-walled abscess. This case was difficult to operate, owing to the density of the bone. After the very extensive removal of bone that was necessary this patient made a slow recovery, requiring months, but never returned to former health

I mention this case to show what sometimes becomes necessary in mastoid surgery in the way of an extensive operative procedure and why an open method is necessary. The necessity and advantages of the open method is what we want to bring out in this discussion.

The determination of the *presence* and the extent of mastoiditis is sometimes as difficult and as obscure as is gallbladder, appendix, and pelvic infection; in these abdominal conditions exploratory incision often is necessary for full inspection and palpation of the organ, before a positive diagnosis is reached. Mastoid surgery is often somewhat of an exploration, as the full extent of pathology is usually not ascertained until the mastoid is evacuated; thus free incision and wide exposure is necessary to enable the operator to locate and remove remote groups of pus-bearing cells And unless all pus-laden cells are removed, healing does not take place. In the diagnosis of mastoiditis the *x*-ray is helpful, especially in demonstrating the type of mastoid and the distribution of cells, however, it is frequently true that very important and diseased cells cannot always be made out in the *x*-ray plate. Ofttimes the *x*-ray leaves the operator in doubt about the character of certain cells, which appear very remote or anomalous in position. In the search for these deep-seated and anomalously placed cells, it is always the part of good surgery to have the important structures, as the dura, the lateral sinus, the horizontal semicircular canal of the labyrinth and the facial

ridge in view, thus safeguarding them It is the thorough removal of all diseased cells that constitutes a complete operation. The case resulting in recurrent mastoiditis, occurring three to six months following primary operation, is usually one in which diseased cells have been overlooked. This sometimes occurs in the open method of operation, but is much more likely to occur in the subcortical, which is in a measure a blind operation.

The chief groups of cells in the mastoid are the zygomatic, the premastoid, the postsinus and tip cells. Of these, the premastoid can readily he reached by the subcortical method; but in many instances the zygomatic, postsinus and tip cells cannot possibly bc removed

Success in mastoid surgery is dependent upon at least two things first, clear visualization of all regions of the mastoid process, namely, the above mentioned, the zygomatic, the posterior sinus, and tip regions Second, the prompt recognition of the important structures within the mastoid which communicate with the brain and which if injured may produce fatal complications

The surgical merit of this operation, the subcortical, is dependent upon whether it is consistent with the principles of surgery; does it emhrace sound surgical principles? It might further he asked, is a blind operative procedure more logical where vital structures are concerned than is an open method where these structures are visible? In reply it must be stated, it is always important to see where an instrument is being placed in the mastoid cavity and to know what tissue is being approached by it

Mastoid surgery is always delicate and often very difficult, therefore free visiblity is always important.

In mastoids ot the type where all cell walls are dense and thick, the blind operation is especially hazardous, owing to the physical disadvantages of the method of anterior approach, and the difficulty of seeing into the cavity and of controlling instruments In this type the gauge and chisel are necessary for removing the dense structures, these instruments cannot be used in the subcortical method

Mastoid surgery is performed in a small field, involving vital structures, therefore the wisdom of making this an open operation, in which each step is plainly seen.

I now wish to show some pictures which I believe will greatly simplify this explanation.

1. This slide demonstrates the anatomy in a large pneumatic mastoid; the cells have been removed, showing the lateral sinus, the semicircular canals and the promontory of the cochlea; most of the posterior canal wall has been taken down. This is a very excellent dissection showing all the important structures.

2. These three slides show the extensive distribution of cells, both far forward in the zygomatic region and far back in the post-

Fig 267.

sinus region and deep tip cells. In these three very obvious cases, it would be physically impossible to remove these cells by the subcortical method If an attempt were made, the operator would be incapable of visualizing the tip of his instrument; he could not know definitely the depth of his instrument. In the subcortical operation, cells are removed with a light small curet with a straight shaft so that it could not reach the zygomatics, the postsinus cells nor the deep tip cells. I believe these slides show how helpless this method would be when confronted by like cases (These slides are represented by Fig. 267 in which

the cortex has been removed, uncovering the widely distributed pneumatic cells Photographed temporal bone, mastoid uncovered.)

3. This shows a very pneumatic temporal bone in which the squama and petrosa are highly cellular and a large group of cells below and behind the lateral sinus is present These cells could not be reached by the subcortical operation. This slide is especially instructive, as it shows a group of cells under the sinus, totally inaccessible by the subcortical method, represented

Fig 268

by Fig 268. (This photographed specimen shows the deep-seated cells under the sinus and extending into and over the pyramid.)

4 This slide shows some very interesting and anomalous anatomy, a large single cell, far forward, lying just beneath the meninges in the middle fossa, and pneumatic cells extending into the pyramid, into the uppermost part of the petrosal bone and about the superior semicircular canal. It is very difficult to remove these cells by the open method and they are impossible of approach by the subcortical This is illustrated by Fig. 269.

5 This slide shows a large tip cell which might be overlooked by the subcortical method In this sclerotic mastoid the method would be difficult and doubly dangerous, many cells must doubtless be overlooked and left without drainage in this keyhole

operation. Furthermore, curetting of dense mastoids is much more hazardous than soft pneumatic or necrotic mastoids. This is illustrated by Fig. 270.

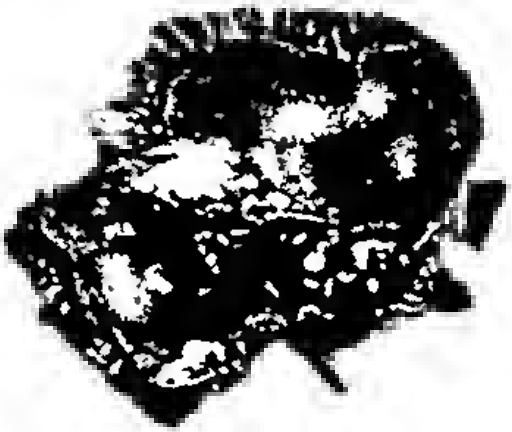

Fig. 269

Fig. 270.

Fig. 271.

6. This slide is interesting because of the cells extending under the jugular bulb, which if not removed might terminate in thrombosis of the bulb, and septicemia which is often fatal These cells could not be reached by the subcortical method. This is illustrated by Fig. 271.

7. This is a very instructive and convincing case. The history is of importance. As you see, this is a very large pneumatic mastoid This patient had been very sick for several days, when admitted to the hospital and because he had general diffuse mastoid tenderness the diagnosis was self-evident and no *x*-ray was taken. The mastoid process was evacuated by the open method and the operation was considered complete and was done by a very competent and experienced otologist. Following the operation the temperature did not subside and it was thought some cells had not been drained. An *x*-ray was then taken which revealed a large group of zygomatic cells filled with pus, subsequent operation cleared up the anterior field with prompt relief and uneventful recovery. These cells could only be reached by the open method

8. This slide shows a double tip mastoid, or sometimes called a double decker It is taken from below upward, showing the two tips separated by a septum of denser bone. In operation, it would defy detection by the subcortical method. In this type of case the operator must look down upon the specimen into the mastoid cavity, in order to discern the deeper layer. This is an unusual type

9 This slide shows a sclerotic mastoid or the infantile type in which the mastoid is undeveloped, with the sinus far forward, adjacent to the anterior cortex. In these small sclerotic cases, the development of the mastoid has been arrested by infection in infancy or early childhood with the result that the sinus has never been crowded backward and therefore remains close to the anterior part of the mastoid and close to the middle ear. A burr in this region might easily penetrate and tear the lateral sinus This is the type of mastoid often seen in the chronic middle ear case of many years' standing, giving rise with acute exacerbation to sudden meningeal and brain complications. In

these cases, it is of the utmost importance to proceed with great caution and by an open method, even with full visibility, the operation is exceedingly difficult An open method is imperative here, because of the very constricted field for operation, the result of the retarded or undeveloped state of this type of mastoid.

It has been the experience of all otologists that these mastoids are exceedingly difficult to operate, even under the most open method. This last type always offers a challenge to the patience, the judgment, and the skill of the operator.

Summary.—This operation, the *subcortical*, does not commend itself to any surgeon who knows the structure of the temporal bone and the wide variations in its surgical anatomy. The operation does not conform to the principles of general surgery, namely, free incision and open field It makes an appeal to the laity and certain medical men who do not understand its erroneous claims. It abounds in fallacies from the initial incision to its final step, the method of drainage and dressing. It is void of sound surgical merit throughout and is both an inadequate and dangerous method, where extensive disease is present or where brain complications exist.

I wish to acknowledge my indebtedness to Mr. E. B. Burchell of the New York Eye and Ear Infirmary for his valued suggestions and the use of his incomparable specimens.

I also wish to thank Dr. Page for his very clear, positive discussion.

Discussion by Dr. John R. Page.—Dr. Neer has very clearly shown by his description of the operation and pictures of the mastoids how impossible it is to remove all the cellular structure through any such opening in the posterior canal wall.

Granting that many cases will recover in spite of such a procedure, as they did in the early days of mastoid surgery when the operation was limited to evacuation of the antrum through a small trephine opening behind the ear, the method seems to me to be so devoid of common sense and the first surgical principle of safety to the patient I am hardly disposed to countenance it even by discussion Somehow I am reminded of the incident

of Huckleberry Finn when Tom Sawyer and Huck plan to free the runaway "nigger," Jim, who is padlocked in an old slab-sided cabin Huck said it would be easy to draw out the staple as it was already loose in the rotten wood, but his practical suggestion was scorned by Tom as too commonplace to attract attention, so they made a long tunnel under the jimson weeds and came up through the floor of the cabin and hauled Jim out to his great discomfort, but to their great glory and satisfaction.

CLINIC OF DR. LEE M. HURD

Fifth Avenue Hospital

CHRONIC INFECTIONS OF THE NASAL ACCESSORY SINUSES

Infection of the sinuses is now the popular fad with the laity. A woman who has an occupational neurosis with a slight mucus nasal discharge now insists she has grave infection in her sinuses and will have all the headaches and pain she can imagine to complete the picture of distress.

At the other extreme is the phlegmatic individual with obstructed nasal breathing, profuse discharge, and probably not complaining of headaches, who wonders why he always feels tired and has no appetite, or may wonder why he has a touch of rheumatism, but does not think that some nasal condition may be the cause of his trouble.

The sinus involvement may run from what could be termed the "latent" type to the most severe infection with fatal complications.

The theory that chronic infection of the sinuses is primarily due to bacteria, poor drainage, and aeration, should be modified. Bacterial infection is always the final process.

Primarily the mucous membrane is deranged by one of three factors, namely. (1) Deficiency in vitamins. (2) Allergia. (3) Endocrine imbalance.

Avitaminosis produces changes in the sinuses which give a favorable soil for bacterial invasion. This has been conclusively proved by deficient diet in rats.

Allergia causes an edematous membrane which may later become infected and progress to inflammatory polypoid degeneration.

Endocrine imbalance causes the mucosa to lose its tone and allows invasion of bacteria, and when the infection has become well established, correction of the underlying cause will not, as a rule, cure the condition Furthermore, the underlying cause cannot always be definitely determined and corrected, because avitaminoses, allergias, and endocrines are not yet fully understood.

The cause of chronic infection of the sinuses therefore is, first, changes in the mucous membrane produced by avitaminoses, allergias or endocrines, followed by invasion of the bacteria normally present in the nose To obtain complete relief of the sinusitis means not only surgery where indicated, but finding the underlying cause

In children, if the sinusitis has not advanced too far, a balanced diet will effect a cure

The allergias are very baffling because there are so many factors to consider, emanations such as street dust and house dust, dander, hair, feathers, etc , foods; intestinal by-products; and physical agents such as cold, heat, and light

The endocrine balance is lacking in many of the patients.

In the majority of patients, the condition is more severe in the winter, due in a large degree to artificial heat. If the efficiency of workers is greatest between the temperatures of 67 and 72, and rapidly decreases below and especially above this temperature, it is reasonable to suppose that they are also more prone to sinusitis as well

Those who work indoors in crowded rooms, where the air is bad and the temperature either too low or too high, especially those with sedentary occupations, are much more prone to sinusitis than those who spend their time out of doors. Exceptions, in this case, are those whose trouble is primarily caused by allergia.

The interior of the normal sinus is sterile, but when the sinus becomes infected the discharge may be detected only by douching. It may be serous mucus, mucopus, creamy pus or flocculent pus. Sometimes it is so scant that centrifuging the return flow and examining it under a microscope will only reveal the pus cells.

The local symptoms are purulent discharge, either anterior or posterior. The anterior discharge suggests the frontals, ethmoids or antra, the posterior the ethmoids, antra or sphenoids. The character of the discharge should be considered. For instance, that resembling sour milk, and which mixes with water is more serious than mucopus that does not dissolve in water. The former, if it persists after repeated washings, especially if there is an odor, indicates serious damage to mucosa or bone

Nasal obstruction may be observed due to swollen turbinates, thick secretion or polyps Incidentally a sinus filled with polyps will probably never clear up until they are removed.

Headache pain and tenderness are not usually present, but when present should be considered serious symptoms. On the contrary during acute exacerbations they are frequently present.

The area of pain is not a reliable index to the sinus involved. In a frontal sinus the pain is usually about the frontal radiating over the forehead. If the antra, the pain is in the cheek, teeth, hard palate or temple If the ethmoids, at the root of the nose and between the eyes, and the vertex In the sphenoids the pain is about the eyes, vertex, mastoid, and occipital regions.

There is rarely swelling of the forehead or cheek. Giddiness and tinnitus may be associated with chronic sinus infection. Anosmia and cacosmia may be a symptom, especially in the presence of polyps or much pus.

Involvement of the ethmoids, I do not believe, can ever be present without change in the mucosa of the middle turbinate The middle turbinate is a part of the ethmoid bone, and whenever there are changes in the labyrinth, they will be noted in the membrane of the middle turbinate. In a normal middle turbinate the mucosa is smooth, thin, pinkish in color and glistens from the normal secretions.

When ethmoiditis is present the middle turbinate changes in color, it is paler and thickened This thickening resembles a low-grade edema along the anterior and inferior border. The turbinate also loses its normal sheen. Later the mucosa of the middle turbinate shows usually a polypoid degeneration, and the

typical text-book discharge of pus is more often absent than present as far as can be determined. The text-books also regularly divide the ethmoids anatomically into anterior and posterior groups, while practically the factor that produces the ethmoiditis has no regard for anatomy All the ethmoid labyrinth is involved, with rare exceptions.

The symptoms run the gamut from nothing the patient can observe, and where only the most careful examination will reveal the pathology, to all the symptoms, pain, discharge, fever, local, and remote complications

When the ethmoiditis becomes well advanced there is no trouble in making a diagnosis There is present, in the hyperplastic type, polypoid degeneration of the middle turbinate, polyps under the middle turbinate, and they may become large and hang down into the nasal space, even to the *floor* of the nose.

The character and amount of secretion varies from scanty thick mucoid to thin pus. As a rule when the discharge is thin pus, the mucosa is less thickened and may even show a false atrophy.

A similar pathology may extend to the frontal, antrum, and sphenoid sinuses If there is a profuse flow of secretion, it probably indicates antrum or frontal invasion. Here again a like pathology may be present with only slight secretion, yet the condition causes more harm than when the flow is profuse.

The frontal, when involved, is usually associated with the ethmoids. There is usually only a sensation of fulness above the eye, pain is only present when the orifice is constricted and dams back the secretion, thus causing sudden increase in pressure.

The antrum is more often associated with ethmoiditis than the frontal. The same facts hold true for the secretion, except that the frontal discharge when present in quantity usually shows in the anterior portion of the middle meatus, whereas with the antrum, it may run from the middle meatus over the inferior turbinate half way back, or flow backward and first appear posteriorly over the inferior turbinate.

Transillumination of the frontal and maxillary sinuses should be done on every patient with nasal trouble, which, although

only an aid, frequently detects trouble in the frontals or antra, not otherwise suspected. Some of the conditions which detract from its reliability are: Absence of a frontal sinus, and this test, showing dark, would mislead one to suspect trouble, or extremely thick bony walls which would reduce the glow. In the case of the antra the test may be misleading in the presence of very thick bone, and in children where the tooth buds of the permanent teeth are under part of the antrum. The test is also doubtful in cases where there has been an old process in frontal or antrum, which has healed. Postoperative thickening will also show dark, where there is no longer any active process.

In maxillary sinusitis, especially when no other sinuses are involved, the relation of dead, infected teeth to the antral floor should be determined by dental *x*-rays, and the viability of the teeth tested. Dental infection of the antrum is more prone to have an offensive odor.

Lavage for diagnosis and treatment can rarely be done on the frontal sinus without previously clearing the way through the middle turbinate and anterior ethmoids. The antrum can be washed out via the natural orifice in 70 per cent of the cases, and failing this, by needle puncture under the inferior turbinate. The results of lavage give valuable information as to the quantity and character of the secretion, which however may be so scanty that it will be impossible to detect unless caught in a black basin, and sometimes even needs to be centrifuged and studied under the microscope.

The sphenoid may be involved separately, but usually it is part of the ethmoid involvement. Sometimes a string of discharge can be detected running down on the membrane of the ethmosphenoid fissure into the nasopharynx.

When the nasal septum is fairly straight, it is possible to introduce a cannula into the sphenoid sinus, and by douching recover the secretion, but in the hyperplastic type there may be little or none.

x-Ray films, well made, with special emphasis on "well made" because poor pictures not only are valueless but even misleading, will show the amount and character of the sinus involvement.

It is surprising how often involvement of the sinuses is detected by means of the *x*-ray when it was not suspected from the history or clinical examination

Prognosis in Chronic Sinusitis.—Generally speaking, patients with chronic sinusitis never recover without treatment Many have a low-grade involvement in which surgery is certainly not advisable, although unfortunately these patients often have been the victims of ill advised surgery. A clear understanding of the underlying cause would save many patients from this unnecessary surgical meddling

Sequences and Complications.—The eye and orbit; orbital cellulitis and abscess, retinal, choroid, conjunctiva and iris inflammations, retrobulbar neuritis In acute exacerbations the middle ear and mastoid may become infected, chronic bronchitis is also a complication Gastro-intestinal disturbances, recurring low-grade pyrexia, loss of body and mental vigor, psychical disturbances from loss of memory to neurasthenia. Recurring erysipelas, meningitis, frontal lobe abscess. Albuminuria, arthritis, certain cardiac lesions In general the sinuses are an important source of focal infection

Treatment.—In children, removal of the adenoids and tonsils may eliminate the source of the sinus infection. Correction of avitaminosis may place the child in a condition to throw off the infection The same holds true for the allergic child

In adults, the vitamins and allergias play some part in prevention, but when the superimposed infection is well established, local treatment, conservative and surgical, is indicated.

Ethmoids that are only mildly involved, slight hyperplasia and secretion with rare exacerbations, should be treated by local applications, and the cause removed if possible. This course is also indicated when the frontal sinuses are involved.

In antrum infections, the antrum should be douched with normal saline daily, as long as an improvement in the character and quantity of the secretion is noted If there is no improvement in the discharge, operation is indicated All infected teeth in relation to the antrum should be removed, and the infected bone about their roots should be curetted away, taking care not

to enter the antrum. If unavoidable, the opening should be as small as possible, and the diseased membrane not disturbed any more than is absolutely necessary, as it will recover after the dental infection has been removed.

The sphenoid should be similarly douched as long as there is progressive improvement.

In well marked, advanced involvement, the above procedure is a waste of time, even in clear-cut allergic cases where a complete cure cannot be expected

Obliteration of the sinus would completely cure the condition if such could be done, but unfortunately only in the frontal sinuses is this possible, and then only with some disfigurement. In sinuses we are dealing with fixed bony walls with the disease in the lining membrane, and rarely in the bone.

Ethmoids that are hyperplastic, causing nasal obstruction and secretion, with a dull, full feeling between the eyes, lack of concentration, with possible extension to the orbit, eye, and bronchi, should be removed. If the *x*-rays show the anatomy of the ethmoid labyrinth to be fairly compact, with not too much extension of the cells over and below the orbit, the cells can be removed completely or nearly so, as well as the whole of the middle turbinate, intranasally.

No otologist would think of making a small opening through the mastoid cortex and blindly curetting the cells. He knows that the chances for a cure would be at a minimum. The same pertains to the ethmoid cells. They are quite analogous, except that the ethmoids were lined with ciliated epithelium before the infection, which subsequently destroyed it. Therefore removal of part of the middle turbinate and curettage of the ethmoidal cells will not improve matters, but probably make them worse.

If the frontal is also involved, removal of the anterior ethmoid cells will take away part of the frontal floor and increase space for natural drainage of this sinus

If the sphenoid is involved, the inner wall of a posterior ethmoid cell is usually a party wall with the sphenoid, externally. Removing this plus taking down the anterior wall as far as possible, will drain the sphenoid. If there is much hyper-

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CONTRIBUTION BY DR. GASTON LABAT

NEW YORK CITY

THE TREND OF SUBARACHNOID BLOCK

DURING the past few years, thousands of patients have been operated upon under subarachnoid block, generally called spinal anesthesia. From the results published, it is evident that most writers are agreed upon the practicability of spinal anesthesia as a routine procedure, particularly for abdominal surgery.

The method is not confined to surgery alone; its scope is being widened every day. Obstetricians are trying to solve their problems by using it in their special field: it is said to be ideal for cesarean section; the parturient in dystocia, as well as in normal labor seems to be greatly benefited by its use.

Diagnosticians have already placed subarachnoid block in their armamentarium. Physicians and surgeons have used it in the treatment of intestinal obstruction of which certain forms are said to be permanently relieved by its administration in due time. We cannot do better than quote from W. J. Mayo's pen: "Spinal anesthesia has the great advantage in cases of probable intestinal obstruction that if no true mechanical obstruction exists, gas and perhaps intestinal contents will pass by the rectum within fifteen or twenty minutes. Therefore, if gas and intestinal contents are not passed after a spinal anesthetic has been administered, mechanical obstruction may be assumed to be present and advantage can be taken of the anesthesia for immediate operation." [1]

Our first demonstrations in the United States of the use of the Trendelenburg position after spinal injection of a simple solution (neocaine dissolved in cerebrospinal fluid) were given in October, 1920, at the St. Mary's Hospital of the Mayo Clinic.[2] It was not without grave but legitimate concern that permission

[1] Surg. Gynec. and Obst., 1920, vol. 1, No. 1, p. 118.
[2] Annals of Surgery, 1921, vol. xiii, p. 1187.

was granted to administer spinal anesthesia, so great was the prejudice against it at that time. Regional anesthesia was introduced at the same time. It is now gratifying to note that, like regional anesthesia, spinal anesthesia has come to stay.

Today, spinal anesthesia is among the most important topics of many scientific programs; at almost every meeting, a note of confidence is struck by those who were the most skeptical The literature abounds in liberal praises and generous comments by its more enthusiastic exponents. Thus is expressed openly the degree of confidence which actually fills the heart of the medical profession in a method which, ten years ago, was considered too dangerous to be worth hardly any space in the valuable columns of the medical journals

The method of subarachnoid block has become so popular that it is now being used by men who do not quite understand its physiology and are not familiar with its clinical aspects. Papers are written which contain too many repetitions, assertions and claims are not based on personal experience, but dictated by excessive enthusiasm. The volume of contributions brought to the literature in recent years bears the statement of extreme popularity.

The bibliography in our files shows the tremendous increase in the number of articles published in 1928, as compared to those which came out in 1921. Between the years 1913 and 1921 interest in subarachnoid block seemed to have been declining all over the world, except in 1919 which was particularly rich in foreign publications. In the United States, 3 articles published in 1921 compare with 51 in 1928 and 55 in 1929.

Greater diffusion of the basic principles of spinal anesthesia soon placed the method in the hands of the more timorous. Its simplicity of technic and the operative advantages it affords are certainly a lure to its use by the inexperienced who are tempted to take a chance. Fortunately, many good students of regional anesthesia have familiarized themselves with the fundamental principles which assure success and are ready to blow the danger signal and focus the safety light on the correct pathways. These students are now scattered all over the country in thirty-

four states in which they are proud to represent the ideals of the American Society of Regional Anesthesia.

Clinical experience has increased and the physiology of spinal anesthesia is now better understood than it was in the early days of the metbod The use of compound solutions has gradually given way to the safer injection of a simple solution in which nothing acts to camouflage the reaction inherent to the method. We know that diffusion is a necessary phenomenon in the production of anesthesia. The addition of ingredients meant to tamper with this phenomenon changes the physiology and may be the cause of untoward results.

A drop of blood pressure is no longer considered a dangerous feature, since it expresses only the dilatation of the splanchnic blood vessels in terms of the peripheral arterial contraction. We know that it should cause no alarm if the correct tecbnic has been used; tbat is to say, if a simple drug like neocaine has been dissolved in the patient's cerebrospinal fluid and injected witb tecbnic, and the patient placed in the Trendelenburg position immediately after the injection

It is not necessary to measure the degree of Trendelenburg by any means. The patient's head is lowered just enough to place it below the level of the pelvis. If a greater slanting position is required, as in the case of pelvic operations, the table may be tilted as much as it can go without prejudice to the patient's health It has been proved that with neocaine dissolved in cerebrospinal fluid, it is of little importance where the solution goes, provided it is injected in the subarachnoid space and the Trendelenburg position assumed immediately after the needle has been removed from the patient's back.

With the use of this technic there is no need for the administration of epbedrine or any other hypertensive drug. If it is deemed advisable to stimulate the heart and nervous system, a dose of our caffeine compound stimulant—

Caffeine	0 25 Gm.
Sodium benzoate	0 30 "
Spartein sulphate	0 05 "
Strychnine sulphate	0 001 "
Distilled water (q. s)	2 cc

may be administered just before the subarachnoid block; half an hour before is preferable. This will not counteract the effects of scopolamine and morphine in doses of 1/300 and $\frac{1}{6}$ grain respectively, nor prevent the fall of blood pressure. These narcotics are meant to allay anxiety and apprehension

With increased experience, revision has been made of the objects to be achieved with cardiac stimulants The use of ephedrine is not indicated with spinal anesthesia, although it has been advised elsewhere to use it in the same manner as the aforementioned cardiac stimulant Of those who have reported good results with ephedrine, almost all have used it in urological surgery which requires, except for the kidney, low anesthesia. Reports of bad results and deaths have been made by men who have injected ephedrine when subarachnoid block was intended for upper abdominal operations

The disastrous effects of ephedrine may be explained as follows: When subarachnoid block is administered for upper abdominal operations, cholecystectomy for instance, the anesthesia intentionally is extended to regions above the diaphragm, involving at least the sixth thoracic nerve, in order to secure anesthesia of the anterior abdominal wall up to the xyphisternum. The splanchnic nerves are thus blocked and the abdominal vessels relaxed. The innervation of the arteries above this level is left intact and free to react to stimuli In administering ephedrine or any other hypertensive drug, these normal vessels contract and increase the poor circulation already existing in the structures which they supply. The brain and medulla oblongata suffer more than the other parts of the body, because their circulatory system is not supported by muscles and aponeuroses and may collapse irremediably.

Splanchnic dilatation creates in the abdominal cavity an area of least resistance against which the heart action is regulated automatically. The general circulation changes aspect in that it is now composed of two zones, namely, the one of low pressure (splanchnic) and the other of normal pressure—high pressure as compared to the splanchnic (head, upper thorax, and upper extremities) The heart adapts itself to such conditions, pro-

vided it is helped by gravity, when the patient rests in the Trendelenburg position.

In forcing the blood in all directions, the heart sends less blood to the territories supplied by the arteries which have not been relaxed, more to the splanchnic area, since the blood follows the line of less resistance. In certain cases, particularly when the change is too violent because of unhealthy arteries, the result is pallor of the face, flattened wrist pulse, low blood pressure reading, occasionally no pulse at the wrist and no blood pressure reading The waves of the heart are not felt in this territory, which is besides poor in blood. In other words, the circulation is more active in the splanchnic area than in the central nervous system on which life depends. The Trendelenburg position is the only means of maintaining in the arteries of the brain and medullary centers a pressure compatible with life.

Now, when ephedrine is given, say before the subarachnoid block, it acts on all arteries alike and raises the general circulatory pressure by closing the capillaries and increasing the peripheral resistance of the whole system. When the anesthetic drug is subsequently injected, it blocks the nervous system of the splanchnic area and leaves the rest intact. It has not been proved that ephedrine has a selective action and prevents the sympathetic system from being blocked by the anesthetic drug. On the contrary, many clinical observations tend to show that it is not so. There will thus be created two centers of vascular tension or pressure, one of low and one of high. The heart pumping into both centers at the same time will fill the center of low pressure (splanchnic area) more easily than if ephedrine had not been given, because of increased pressure in the center of high pressure. The higher nervous centers on which life depends may thus be left very anemic and ready to die.

In giving ephedrine after the pressure has fallen, a similar condition is brought about, viz., the peripheral resistance is increased mostly in the territory left intact by the anesthetic drug. The blood pressure taken at the arm is bound to show a rise, as soon as the action of ephedrine is felt. But no more blood goes to the higher regions than had been going before the

injection of ephedrine. It is only a condition of increased differential pressure which, we believe, is dangerous to life. The territory in which the nerves are not blocked being wide in the case of urological operations, prostatic and bladder in particular, reports are thus favorable when made by urologists.

Fatalities caused by the injection of ephedrine may be concisely explained by the following reactions:

1. Larger center of low pressure (splanchnic depression) as compared to that of high pressure (cerebral and medullary pressure).

2. Defective splanchnic arteries which can be made to dilate under increased differential peripheral blood pressure.

3 Violent response of the vascular area unaffected by the anesthetic, with resulting closure of the capillaries.

4 Progressive increase in splanchnic dilatation.

5. Progressive impoverishment of the vital centers (respiratory and cardiac)

6. Progressive anoxemia through lack of proper ventilation.

7 Respiratory and cardiac collapse in rapid sequence.

We have not seen a death attributable to ephedrine, but have had reports of their occurrence. It is, therefore, advisable not to use it at all, because we have no means of restoring conditions to normal. Why should we be afraid of the presence of low blood pressure, since we are certain that, when a patient dies, it is not from low blood pressure, but from anemia of the brain? We know that the vital centers will be kept well supplied with blood if we hasten and place the patient in the Trendelenburg position without loss of time. Of what importance is blood pressure reading when we know that it does not mark the general condition of circulation, but the extent of vasodilatation in the splanchnic area? Of what good is ephedrine if it cannot raise the pressure in the splanchnic area where it is most urgently needed? It can find no place in the method of subarachnoid block, but can certainly be detrimental to the method.

Spinal anesthesia should be used by those who are familiar with its physiology, this cannot be too often repeated. Considering the interest taken in the method, as evidenced by the number

force of injection and the reaction of the cerebrospinal fluid to the bombardment of the particles of the injected fluid. It is extremely difficult to deposit any kind of solution without setting in motion the cerebrospinal fluid itself. The proposition that certain fluids act "as an air bubble on a spirit level" after they have been injected into the spinal canal cannot be well proved. If they did act as such, the solution would come in contact with such a small number of nerves as to render the anesthesia almost negligible It is, therefore, necessary that the diffusion be wide enough to warrant the use of the method of subarachnoid block

Moreover, admitting that diffusion may be delayed by mixing certain ingredients, like gliadin and alcohol, with the anesthetic drug, in the form of spinocaine for instance, it is unreasonable to believe that it is possible to regulate the time at which the anesthetic drug will be liberated from such compounds and the rate at which this will be done, and also to what extent the diffusion will be carried. It is almost unbelievable that a parallel could ever be established between an empiric speculation and the scientific precision involved in the timing of the firing of a bomb, with estimation of the air displacement which follows.

We are thus left with only one technic by which diffusion actually takes place on a smaller or larger scale in the subarachnoid space, and that technic involves diluting the anesthetic solution by mixing it with cerebrospinal fluid. The anesthetic drug is thus spread evenly over a certain area of the cord which it soaks. Since this dilution cannot be made *in vitro*, that is, in the syringe, it is necessary that either a forceful injection or barbotage be the procedure used to dilute the anesthetic fluid with the cerebrospinal fluid. The even mixture thus obtained will affect the nerves with which it comes in contact, and thus turn off the switch and interrupt the passages of painful impulses from the periphery to the brain.

As far as we know, two procedures have been proposed for inducing subarachnoid block, namely, (1) the old method of controllable spinal anesthesia, and (2) the newer method of spinal anesthesia by dilution and homogeneous diffusion, which is, however, many years old.

1. The method of controllable spinal anesthesia which, if we are not mistaken, was a creation of the time of Barker, consists in injecting solutions of different specific gravities with the aim of inducing anesthesia at definite levels of the spine; the levels were expected to be regulated by the position given to the patient after the injection. Without entering into any detail, we shall say that the results obtained with these solutions were far from being satisfactory and the method of spinal anesthesia fell into oblivion, if not into disrepute. In 1920 it enjoyed the reputation of a dangerous method. This was the condition in which we found it.

2. Then comes the method of spinal anesthesia by dilution and homogeneous diffusion of which the simplicity is a guaranty of safety. It needs *only one important movement; Trendelenburg position immediately after the injection has been made.* This position should be maintained during the operation and at least three hours after the operation.

Preliminary narcotics are not indispensable. The injection of epbedrine or any other hypertensive drug is useless, occasionally harmful, as already stated.

The technic of dilution and homogeneous diffusion may permit of anesthesia for operation on any part of the body. In other words, it may result in general analgesia. It may also restrict tbe anesthesia to the line of the nipples, tbe xyphisternum, tbe umbilicus, the lower extremities or even the perineum and anus. It is not necessary to inject a heavy fluid to have such results In fact, great doubt is entertained concerning the claims which were made in favor of solutions of heavy or light specific gravity.

As already stated elsewhere, we do not see any reason for anesthetizing the entire body by any method whatsoever, when many procedures of nerve block are available for operations on the head, neck, and thorax, upper extremity and limited areas of the lower trunk and lower extremities. These procedures may be used exclusively or associated with light narcosis, according to the needs of the particular case and considering the welfare of the patient.

We are ready to recommend without reserve the use of spinal anesthesia for abdominal and pelvic operations, major amputations and other important operations of the lower extremity, provided it be administered by experienced hands The meaning assigned to the word "experience" has been given in the first paragraph of "Elimination of the Dangers of Spinal Anesthesia."[1]

The essential elements of the Labat technic are: (1) Anatomical puncture of the spine; (2) injection of neocaine-cerebrospinal fluid with barbotage; (3) immediate Trendelenburg position Nothing could be simpler

Where to puncture: Any space between the twelfth dorsal and fourth lumbar spines, according to the extent of anesthesia desired

How to puncture: Follow the middle line; keep the bevel of the needle facing east or west of the middle line of the back.

What needle: Medium gauge. The Labat (80/11) nickeloid, unbreakable needle has been tested, improved and used for the last fourteen years with uniformly good results Its specifications have been given elsewhere

What anesthetic solution. Neocaine[2] crystals dissolved in cerebrospinal fluid, with which the author has had no death since its introduction in surgical practice in 1916.

What dose· Adults, from 0.10 to 0.20 Gm.; the dose of 0.12 and 0 15 Gm. being sufficient in the great majority of cases Children from 0 03 to 0 10 Gm.

Amount of fluid Always the capacity of the ampule (3 cc.) whatever be the level of anesthesia desired, from the line of nipples to lower extremities.

Barbotage. Always; reducing the quantity of new fluid aspirated and number of aspirations as lower punctures are made, in order to lower level of anesthesia.

Trendelenburg position. Immediately after the needle and syringe have been pulled out of the back Do not lose time in

[1] Amer Jour. of Surg., 1928, vol 5, No 6, p 625

[2] French product manufactured by the Corbiere Laboratories, Paris, France Distributed in the U S A by the Anglo-French Drug Co., 1270 Broadway, New York City

placing a dressing or a drop of collodion. We have never seen an infection at the site of puncture. Have the shoulder blades ready on the table. Precious time is too often lost in going after them.

When the operation has been completed, see that the *horizontal position be not restored* and that the *elevator* is *ready*. Transfer patient on adjustable stretcher with head lower than pelvis. Improvise one with cushions, if none is at hand. Raise foot of the bed on the seat of a chair, if shock blocks are not handy at the time the patient is placed in bed. Maintain this position for three hours at least.

Cardiac stimulants: If deemed fit, caffeine and strychnine may be given subcutaneously one half hour before the induction of anesthesia. After the operation, 1 cup of hot black coffee taken by sips. In the presence of nausea, close nose with fingers used as clamps on the nostrils and force patient to take deep breaths through the mouth; apply cold sponges on neck. These are exceptional cases, but they need mentioning.

No ephedrine, epinephrine or any other hypertensive drug before or during spinal anesthesia

Make this a rule, commit our advices to memory and execute our simple technic if a clean record is to be expected.

CLINIC OF DR. HENRY C. FALK

HARLEM HOSPITAL

SUPRAPUBIC TRANSVESICAL OPERATION FOR VESICO-VAGINAL FISTULA

THE first case for discussion this morning is:

Mrs. H. M., age forty-six years, housewife. Nativity, Sweden. Admitted 10/17/29.

Chief Complaint.—Leaking from the bladder. Unable to hold her urine.

Present Illness.—Began following a hysterectomy performed 7/11/29. She was advised by her surgeon to go home and her condition would improve. She now states that her condition did not improve and she presents herself to us for surgical intervention.

Physical Examination.—Middle aged white female. Age forty-six years. Does not look acutely ill. Well nourished. Complains of urinary loss from vagina.

General physical examination is negative.

Abdomen soft, slight distention of lower abdomen. Median scar of abdomen, below umbilicus.

Vaginal Examination.—Inspection shows a profuse watery discharge with some redness and excoriations around the vulva. Perineum firm, vagina roomy, cervix small, external os closed. Fundus of the uterus and adnexa cannot be felt. The small cervical stump can be felt bimanually. On the anterior vaginal wall, about 1 cm. below the cervix, there is felt an opening into the bladder

[illegible]

vagina into the bladder

Urine clear, contains no albumin, nor white blood cells.

Wassermann negative

Diagnosis.—Vesicovaginal fistula on the anterior vaginal wall, high up, in a nulliparous patient on whom a supravaginal hysterectomy had been performed.

There are three methods of approach:

1. Transvaginal.
2. Transabdominal
3. Transvesical

Transvaginal.—This is by far the method to be preferred, but owing to the inaccessibility of the fistula, the inability to draw the cervix into the vagina, due to it being fixed by the broad ligament and scar tissue and lastly the possibility of opening the peritoneal cavity, this method was discarded.

Transabdominal.—The abdomen could be opened through the old scar, the vesico-uterine fold of peritoneum and the bladder stripped from the vagina, exposing the fistulous tract very readily and thus closing it This method presented none of the technical difficulties of the vaginal route, but owing to the danger of the possible infection of the peritoneum, it was voted down.

Transvesical.—This method, *i e*, opening the bladder from above and attacking the fistulous tract in that way, had much in its favor First The fistulous tract being close to the cervix would be high and therefore accessible. Second The danger of opening into the peritoneum would be slight because the wound would be constantly under direct vision Third The suprapubic wound lends itself well to the postoperative drainage of the bladder, removing all tension from the suture line The transvesical method was therefore decided upon

Preoperative Preparation.—The patient was given bidaily vaginal douches and the skin was protected by Lassar's paste In a few days all the excoriations and the redness had disappeared

The vagina was thoroughly dried under direct vision and painted with a 2 per cent mercurochrome and acetone and alcohol solution A large sterile gauze pad was introduced into the vault of the vagina for traction and held there with 2-inch packing A catheter was inserted into the bladder through the urethra

The patient was then given 120 mg of novocaine (Metz) intradurally introduced at the level of the second lumbar spine

Operative Procedure.—The patient was placed in the Trendelenburg position The old scar in the anterior abdominal wall was excised The fascia was incised, the rectus muscle retracted and the prevesical space exposed The bladder was then filled, through the catheter, with sterile boric acid solution and as the bladder came into view, two traction sutures were placed on either side of the bladder The bladder was then incised between

the traction sutures and its contents removed by suction The catheter was also removed.

The gauze sponge which was in the vagina was then grasped with an Allis clamp through the fistulous opening (Fig. 272) The vaginal packing was then removed. Traction on the gauze sponge brought the fistulous tract directly into the wound The edge of the mucous membrane of the bladder was incised around the entire circumference of the wound. The bladder wall was then dissected from the vagina freely in all directions so as to relieve all tension (Fig 273)

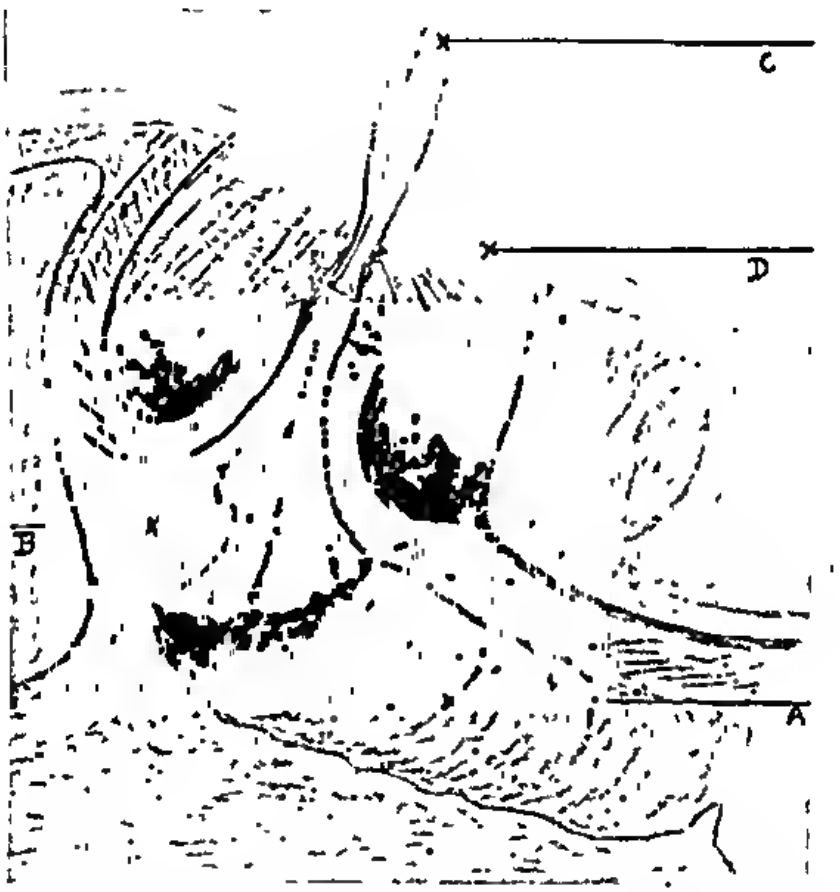

Fig 272 —A, Vagina, B, cervical stump, C, Allis clamp grasping the gauze through fistulous tract and drawing the fistulous tract up to the suprapubic wound (D)

The vaginal mucosa was then closed with a layer of interrupted chromic catgut sutures, the knots being placed in the vagina. The second layer of sutures was then placed through the wall of the vagina. A third layer of sutures was placed through the musculature of the bladder and a fourth layer was placed up to but not through the mucous membrane of the bladder, with the knots tied deeply (Fig 274)

The cystotomy wound was then sutured to the fascia of the anterior abdominal wall and a suprapubic drainage tube inserted The rest of the wound was closed in layers

Postoperative.—The patient received daily bladder irrigations with warm boric acid solution until the return was clear, following which 1 ounce of 10 per cent argyrol was instilled into the bladder and left there. On the

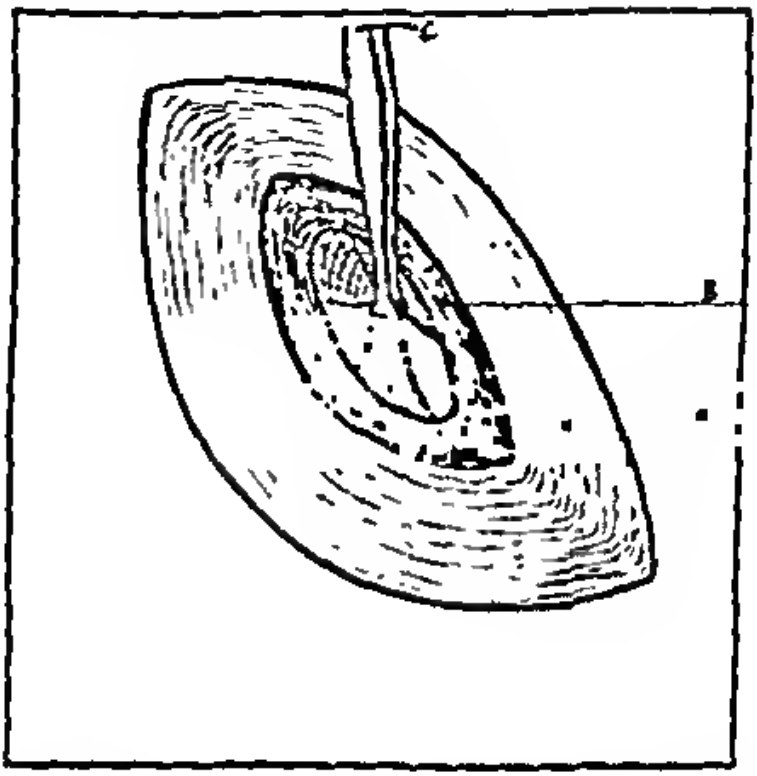

Fig. 273.—Bladder wall (A) dissected from the vagina (B) freely in all directions. C, Allis clamp drawing on gauze in the fistulous tract so as to bring the vagina up into the wound.

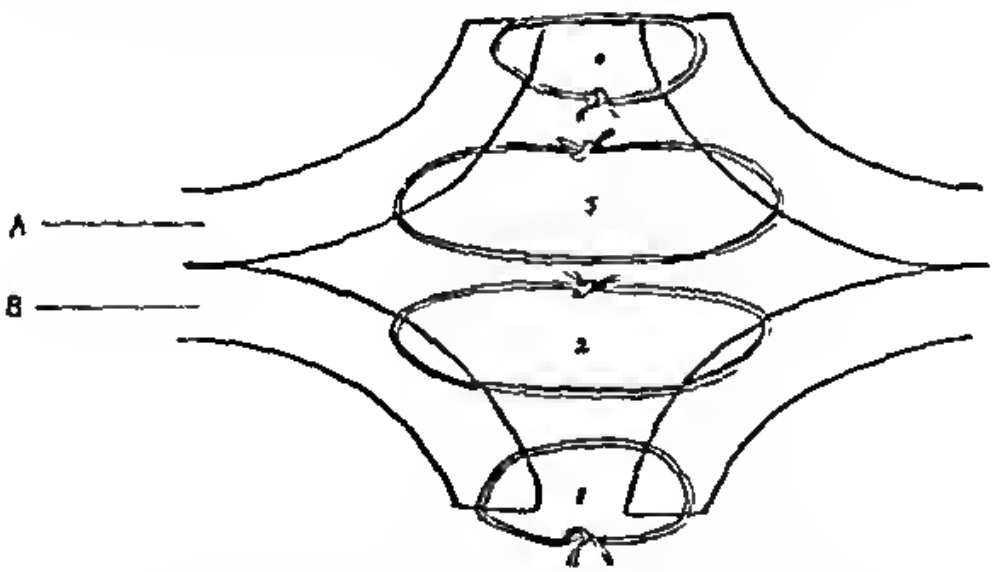

Fig. 274.—Arrangement of the four rows of sutures closing the opening in the vagina (B) and the opening in the bladder (A).

eighth day, the silk sutures were removed. Wound clean, except for a drop of pus at edge of stitch. On the seventeenth day, postoperative, the supra-

pubic drainage tube was removed. On the twenty-first day, the patient voided through the urethra. The abdominal dressings were still moist. The patient was allowed out of bed. On the twenty-sixth day, the amount of suprapubic drainage was gradually diminishing. When the patient lies in bed at night, dressings are dry and all urine is passed through the urethra. On the thirty-first day, the patient is cured and discharged. Abdominal wound healed completely. Vaginal examination shows scar of fistula well healed.

OPERATION FOR VESICOVAGINAL FISTULA AND RECTO-VAGINAL FISTULA ON THE SAME PATIENT

The second case is:

Mrs F W, age thirty-nine years. Occupation, waitress. Admitted 11/21/28

Chief Complaint.—Incontinence of urine. Bowels move through the vagina

Present History.—About two months ago, patient found that she could not hold her urine, nor could she urinate voluntarily. She found herself constantly wet. She had no pain. When her bowels moved, the feces came through the vagina She maintains, after repeated questioning, that both of these conditions came spontaneously, without any known cause. She cannot move her bowels unless she takes a cathartic. She has not lost any weight.

Past History.—In 1917 had a posterior colpotomy performed at Bellevue Hospital No other operations Her Wassermann at that time was four plus (1918) She received mercury and salvarsan treatment for six weeks.

Menstrual History.—Regular 14 x 28 x 3 Last period one week before admission to hospital

Obstetrical History.—Two miscarriages spontaneous. No full term children

Otherwise, her history is negative

Physical Examination.—Shows an adult colored female who does not look ill

General Examination.—Negative.

Vaginal Examination.—Skin around vulva and anus markedly excoriated. Fecal matter and urine constantly running from the vagina On introducing the finger into the vagina, the perineal body is solid On the posterior vaginal wall, 5 cm above the perineum, the finger enters the rectum through an opening about 2½ cm in diameter The cervix is cone shaped and hard, the external os is closed and the cervix lies in the rectovaginal fistula. On the posterior vaginal wall, above the rectovaginal fistula, there is about 3 cm. of vaginal mucous membrane In front of the cervix, there is a transverse scar about 5 cm long, directly under the symphysis. Urine is constantly escaping around the fingers, but the opening into the bladder cannot be palpated On inserting a speculum into the vagina, the rectal mucous membrane is found bulging into the vagina and the cervix lies in the rectovaginal opening The vesical fistula cannot be seen

Diagnosis.—Rectovaginal fistula and vesicovaginal fistula, of syphilitic origin.

The question now arose as to what should be done for this patient. Her Wassermann at this time was four plus. Owing to

the fact that both of these conditions were of specific origin and in the face of a four plus Wassermann, any attempt at repair would be doomed to failure, unless the specific infection were controlled. The vesical fistula could not be repaired in the presence of the constant infection from the feces and the rectal fistula would not heal in the presence of a constant flow of urine. A sigmoidostomy was therefore performed in order to shunt all the feces through the abdominal wall. This would allow a thorough cleansing of the vagina, and at the same time the patient could be placed on strong antisyphilitic treatment.

The patient was treated in the dispensary for her syphilitic infection for about two months. Her sigmoidostomy wound functioned well, after which she was lost sight of.

8/14/29. The patient presented herself again to the dispensary for treatment and was immediately admitted to the hospital.

Her general physical examination at this time was practically the same. Vaginally, however, she showed the following:

The rectal fistula is about 3 cm. in diameter and clean, all the feces are being delivered through the sigmoidostomy wound. The 5 cm. transverse scar which was close to the cervix and directly under the symphysis has entirely disappeared and in its place is a fistulous tract, about 4 × 2 cm. into the bladder. On placing the patient in the knee-chest position and inserting a Sims speculum, we find an elliptical opening into the bladder, extending almost half way around the cervix. The mucous membrane of the bladder has good color and there are no incrustations along its edges. An attempt could now be made to repair the vesicovaginal fistula. The patient was placed upon daily vaginal irrigations with boric acid solution and given injections of neosalvarsan intravenously, and mercury intramuscularly. After six weeks of intensive antisyphilitic treatment, on 9/30/29 an attempt was made to repair the vesicovaginal fistula.

Operation.—One hundred and twenty mg. of novocaine (Metz) were inserted intradurally at the level of the second lumbar vertebra. Patient placed in the lithotomy position and the entire vagina painted with a 2 per cent mercurochrome, acetone, and alcohol solution. A left Schuchardt incision was then made to allow free access to the vesicovaginal fistula. A weighted speculum was inserted, the blade of which covered the rectovaginal opening. The cervix was grasped with a tenaculum forceps and drawn down into the wound. The bladder was separated from the anterior wall of the uterus, up to the peritoneum, thus mobilizing the entire posterior bladder

large amount of scar tissue, particularly on the right side of the fistulous tract. The edges of the bladder were freshened and sutured with an interrupted

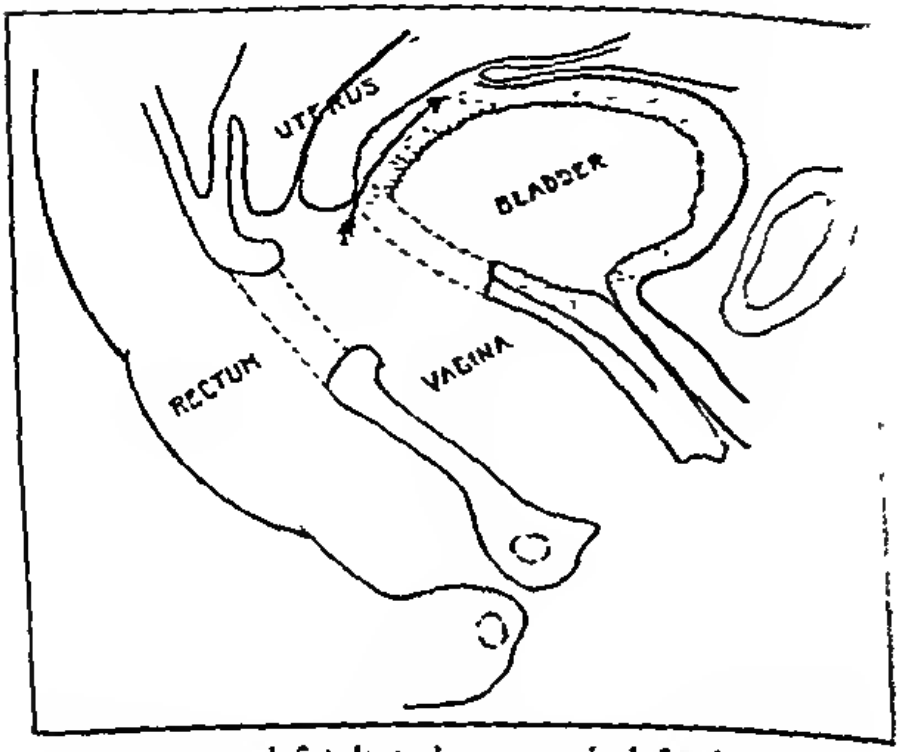

Fig 275.—Rectovaginal fistula and vesicovaginal fistula. Arrow points to the line of separation of the bladder from the uterus.

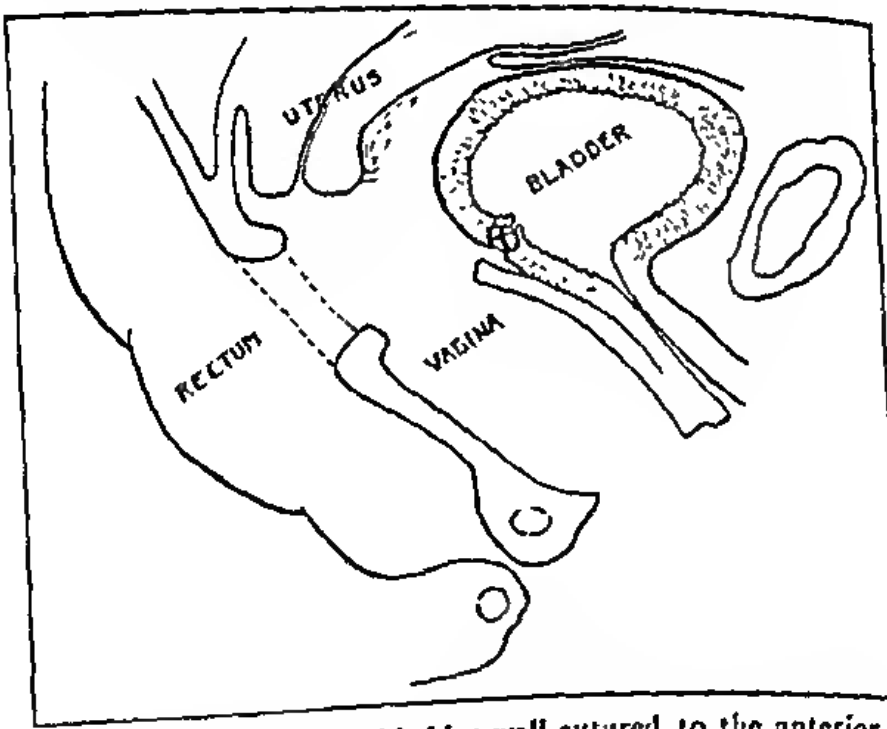

Fig. 276.—Mobilized posterior bladder wall sutured to the anterior edge of the bladder wall, closing the fistulous tract.

Connell stitch (Fig 276) The mucous membrane of the vagina was then sutured to the anterior lip of the cervix. A self-retaining catheter was inserted into the bladder and one piece of iodoform gauze was placed in the vagina.

The patient made an uneventful recovery Packing removed in twenty-four hours After the seventh day, the bladder was irrigated daily with boric acid solution and 1 ounce of argyrol instilled The vagina had to be cleansed daily owing to the presence of occasional particles of feces, the patient having developed a diarrhea, so that her sigmoidostomy wound did not function completely

10/29/29 One month after the operation, examination showed the cervix almost at the introitus The vesicovaginal fistula is closed through its entire extent, except for a pinpoint opening at the extreme left angle

About one month after her vesicovaginal fistula had healed and the patient had received further antiluetic treatment, the repair of the recto-vaginal fistula was attempted The rectum had been thoroughly cleansed with daily permanganate irrigations for one week and on 12/6/29 she was again taken to the operating room and the following procedure carried out

One hundred and twenty mg of novocaine (Metz) was introduced intradurally at the level of the second lumbar vertebra, the patient placed in the lithotomy position Retractors inserted into the vagina on each side and anteriorly The anterior retractor held the cervix out of the wound The edges of the fistulous tract were grasped with Allis clamps and incised around its entire circumference The mucous membrane of the vagina was then separated from the rectum This presented some technical difficulties, particularly at the right and left angles where considerable scar tissue was encountered The scar tissue was cut through and the anterior rectal wall mobilized for a distance of about 4 cm above the edge of the fistulous tract (Fig 277), and as far down as possible, almost to the perineum On the right and left sides, the rectum was also freely mobilized so that the edges could be brought together without tension The edges of the fistulous opening into the rectum were freshened and silk sutures were inserted and tied on the rectal side These sutures were left long and drawn through the anus, thus displacing the rectal suture line without tension about 2 cm below the vaginal suture line (Fig 278) The loose areolar tissue over the rectum was sutured, making a second layer The rectum was then sutured to the posterior surface of the lower vaginal flap, thus fixing the rectal suture line below the vaginal suture line The mucous membrane of the vagina was closed with interrupted chromic catgut sutures without tension, in a Y-shape manner A large tube was placed into the rectum for a distance of about 5 cm above the suture line The lower edge of this tube was sutured to the anal opening on two sides One piece of iodoform gauze was inserted in the vagina

Postoperative course was uneventful The iodoform gauze was removed from the vagina in twenty-four hours The sutures to the rectal tube cut through on the third day and the tube was expelled The silk sutures in the rectum cut through of their own accord and were removed on the ninth day. Fourteen days after the operation, a pressure bandage was applied over the sigmoidostomy wound and the patient had a normal bowel movement through the rectum

Pathologic examination of the tissue removed from the rectal wall at the time of the operation showed chronic productive inflammation

On 1/10/30, under spinal anesthesia, the sigmoidostomy wound was

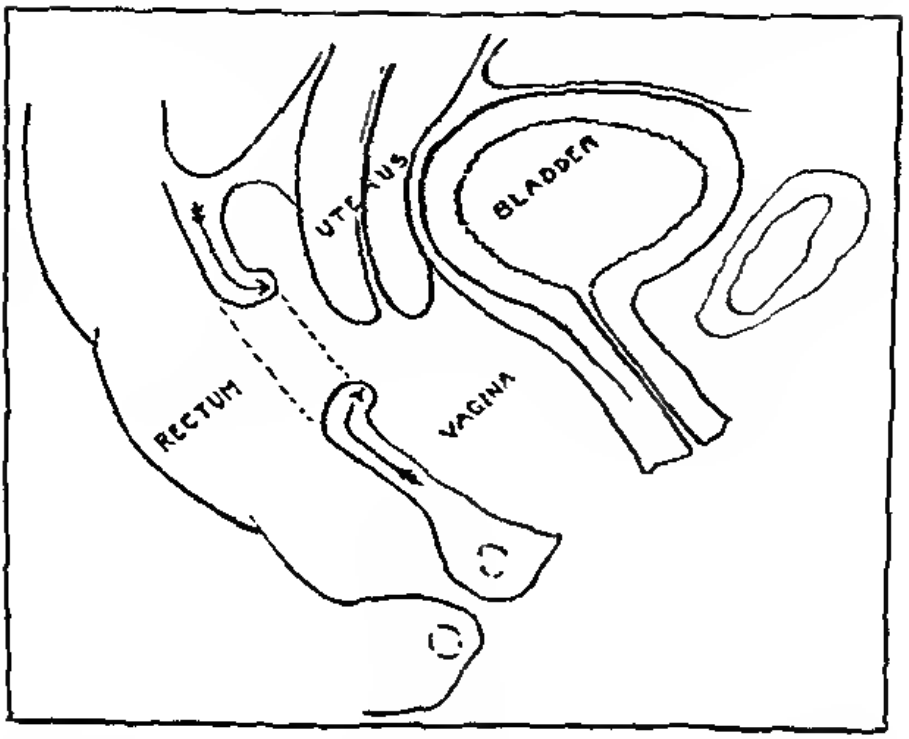

Fig 277.—Vesicovaginal fistula completely closed The two arrows point to the line of separation of the vaginal from the rectal mucous membrane in the rectovaginal fistula.

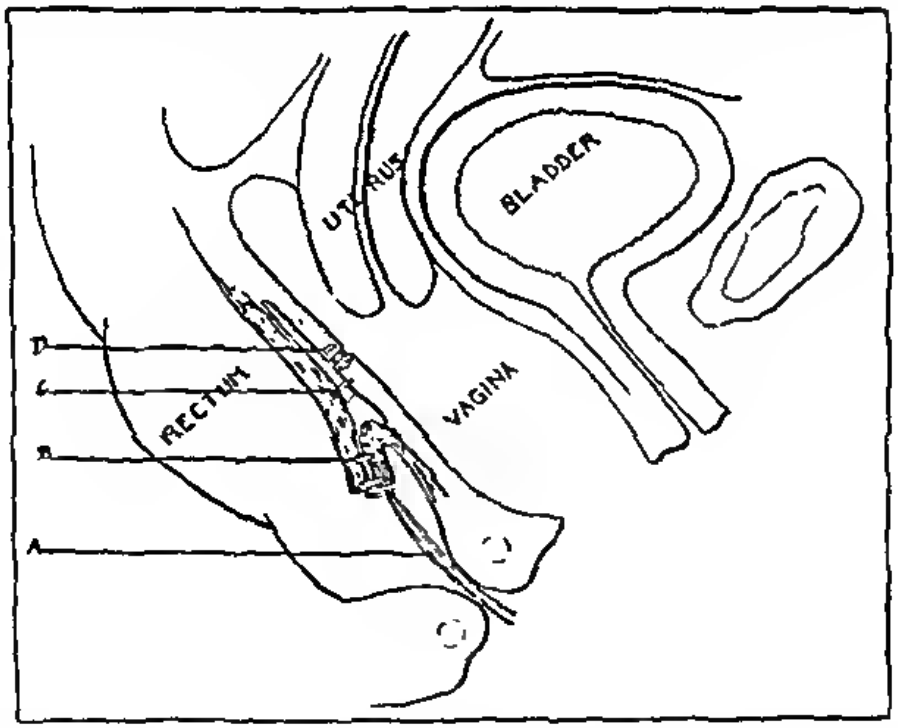

Fig 278.—The silk stitch (A) through the rectal wall being drawn out through the anus and displacing the rectal suture line about 2 cm. below the vaginal suture line B, Suture through the areolar tissue of the rectal wall C, Suture through the rectal and posterior vaginal wall fixing the rectal suture line below the vaginal suture line D, Vaginal suture line

closed The patient made an uneventful recovery and left the hospital 1/20/30, her bowels functioning normally. The small pinpoint vesicovaginal fistula was still present. This fistula does not disturb her very much. She is to continue her antiluetic treatment and if the fistulous tract does not close in six months, she will be readmitted and reoperated. It would be a grave error to reoperate the small vesicovaginal fistula at the present time. Next to tension on the suture line, there is nothing more conducive to failure than reoperation within too short an interval. Nature must be given an opportunity to reestablish circulation and to absorb exudate before a second operation is undertaken

Rule 1.—In all fistula repair work bring raw surfaces, not scar tissue, into direct contact without tension.

Rule 2.—Whenever possible have the suture lines at different levels.

Rule 3.—Do not reoperate a fistula for at least three months.